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RESEARCH ARTICLE

Reaction Lights-Based Shadow Training Model: Effect On Agility Of Deaf Badminton Players

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ABSTRACT

Deaf badminton players need appropriate methods to train agility by optimizing the visual sense. The reaction light-based shadow training method is an effort to increase agility, but this method has not been tested. The research aimed to determine the effect of the light-based shadow training method on deaf badminton players' reactions to agility. The research method is an experimental one-group pretest-posttest design. Participants were deaf badminton players aged 20-35 years, male and female, weight 65-75 kg, height 160-175 cm, totaling 20 people taken through purposive sampling. The instrument is the badminton shadow test. Data collection techniques are interviews, observations, and tests. The data analysis technique is descriptive analysis and the nonparametric Wilcoxon test. In the research results for the male group, the significance value was 0.001<0.05 with the difference between the mean pretest and posttest values being 3. In the research results for the female group, the significance value was 0.025<0.05 with the difference between the mean pretest and posttest values 3. It was concluded that there was a significant difference in the results before and after being given. training using a reaction light-based shadow training method for the agility of deaf badminton players. Therefore, the reaction light-based shadow training method can be a method for improving deaf badminton players.

1. INTRODUCTION

Disability is a subject that needs to be studied. Aside from mental, intellectual, and physical disabilities, sensory disabilities are interesting subjects to research in further depth. This sensory disability includes impaired sensory function, especially vision, speech and hearing. Deaf disability is a state of loss of hearing function caused by an accident, disease, or even since birth (Irish et al., 2017). Assessing sensory disabilities in sport is important. People with sensory problems should be encouraged to participate in sports so they can enjoy life and thrive in it. Badminton is one of the sports that deaf sensory people are interested in (Pusppanathan et al., 2019). Deaf badminton participation demonstrates extraordinary developments in performance sports (Gaol, Lumban et al., 2021). In this instance, disabled participants' enthusiasm for badminton is increasing. Despite having sensory disabilities, the

players badminton is still able to optimize the training program.

Training programming is one of the keys to badminton players' success in obtaining peak performance. In this case, the trainer is someone who helps to structure the programming effectively. Trainers require the following core skills: leadership, analysis, management, and teaching skills (Lara-Bercial & John, 2020; Robinson, 2010). In terms of teaching skills, trainers must be proficient in both practical and theoretical aspects. In this case, the trainer is well-versed in academic knowledge and has strong practical experience, allowing him to quickly adapt it in real-world match situations (Hidayah & Akhiruyanto, 2023). When developing a training program, a trainer must have both theoretical and practical knowledge. Furthermore, the programming of physical conditions in disability sports must be tailored to the characteristics of the disabilities to determine which methods are most appropriate (Yulianto & Yudhistira, 2021).

The physical aspect of badminton is an important thing (Imam et al., 2021). The physical aspects of badminton include flexibility, strength, speed, power, and agility (Dameria et al., 2023). In this case, agility is vital in badminton, such as when moving to the right and left and then returning to the original position, or stepping forward and backward and then returning to the original position. Agility is defined as an ability to change direction swiftly in a relatively short time (Mitić et al., 2018; Saputra & Muzaffar, 2022; Sumaryanti & Tomoliyus, 2018; M. Tomoliyus et al., 2019). However, the current definition of agility is the ability to change direction swiftly, precisely, and without losing focus in response to unexpected stimuli (Yudhistira et al., 2021; Yudhistira & Tomoliyus, 2020; Zemková & Hamar, 2014). As a result, methods of training must be adapted to these characteristics to effectively integrate agility-related aspects. The shadow method is a common method for improving badminton players' agility.

Of course, earlier studies have used the shadow training method, such as one conducted by Nirendan and Murugavel to increase the motor skills of school-level badminton players (Nirendan & Murugavel, 2019). The influence of shadows on the endurance of badminton players (Ishak et al., 2020), the development of a footwork training model for beginner badminton players (Subarkah, 2018), shadow training method based on step application for badminton players (Ihsan et al., 2023), the effectiveness of training methods shadow uses lights to improve badminton players' footwork (Nugroho, Ika et al., 2023). The research report focused on typical badminton players, used the usual shadow method, and only examined aerobic endurance. Furthermore, numerous studies use technology-based shadow training methods using step and light-based applications, although the focus is on regular badminton players.

This research did not provide a precise explanation for the workout program. Although there are one or two studies on light-based shadow training methods, the invention and testing of training methods for hearing-impaired badminton players that improve agility has received little attention. Therefore, this research aims to determine the effect of the reaction light-based shadow training method to improve the agility of badminton players with hearing impairments.

2. METHOD

Participants

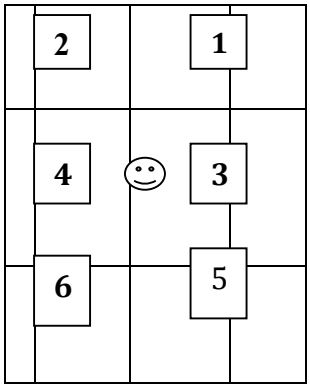
The research method employed was experimental field testing with a one-group pretest-

posttest design (Hadi & Yudhistira, 2023). In this scenario, field testing is intended to assess the effectiveness of programming utilizing the reaction light-based shadow training method. The effectiveness test included 20 badminton players with special needs, both male and female. Purposive sampling was used to choose participants, who met the following criteria: (1) Badminton players who have competed in regional level badminton matches (2) Are willing to participate in programming for 16 meetings with proof of a certificate, and (3) Are in good condition. In this case, the sample fits the criteria: 20 participants, 15 men and 5 women, ages 20 to 35, weight 60-75 kilograms, height 160-175 centimeters.

Procedure/Test protocol/Skill test trial/Measure/Instruments

The procedures for this research are as follows: (1) The author conducts an initial agility test with the help of three research assistants, utilizing badminton-specific agility test instruments; then conducts an evaluation to serve as a basis for creating training programs, (2) The author prepares training programming using reaction light-based shadow aids accompanied by setting the intensity and volume of training, (3) The author provides direction and guidance to badminton athletes with hearing impairments, then warms up using static and dynamic stretching, (4) The author provides treatment for 16 meetings at a frequency of three times each week, and (5) After the treatment is completed for 16 meetings, the author conducts a final test to see the increase in agility. The test instrument is the shadow agility test from Tohar with a validity of 0.98 and a reliability of 0.93 (Kusuma, Wijaya & Aminullah, 2019). The training program is presented in Table 1 as follows:

Table 1. Exercise dosage and description

Material	Training dose	Information
Warmup a. Jogging b. Static stretching c. Dynamic stretching	a. 3-5 rounds of the badminton court b. 8-10 counts in one movement c. 8-10 counts in one movement	a. Players are guided to carry out jogging, static and dynamic warm-up before carrying out core training
Core training: Reaction light based shadow training  	a. Maximum training intensity, b. working time 30 seconds c. sets 2-3-4-5-6 etc d. 30 second intervals e. recovery 2 minutes.	a. Badminton players were given instructions regarding light-based shadow model training procedures b. The player carries out the exercise, first, the player is in the middle position, then waits for the action light to come on. The player runs as quickly as possible with one footstep into the box, then returns to the middle position again, and so on until the reaction light goes off.
Cooling down a. Jogging	a. 3-5 rounds of the badminton court	a.a. Players are guided to carry out jogging, static

b. Static stretching c. Dynamic stretching	b. 8-10 counts in one movement c. 8-10 counts in one movement	and dynamic warm-up before ending core training

Data collection and analysis / Statistical analysis

The data analysis employed comprises quantitative descriptive analysis, which displays minimum, maximum, mean, and standard deviation values. The Wilcoxon nonparametric hypothesis test was then utilized in the next test, which compared the pretest and posttest after 16 training meetings. The reasonable explanation for utilizing non-parametric analysis is that it does not pass the normality prerequisite test, hence a non-parametric test can be applied (Yudanto, Suherman, et al., 2022; Yudanto, Yudhistira, et al., 2022).

3. RESULT

The results section describes the descriptive analysis of the pretest and posttest as well as the Wilcoxon test presented in tables 2 and 3 as follows:

Table 2. Results of descriptive analysis of pretest and posttest agility

Gender	Variabel	N	Min	Max	Mean	Std. Dev
Male	Pretest agility	15	12	14	12	.676
	Posttest agility	15	13	18	15	1.207
Female	Pretest agility	5	12	14	12	.837
	Posttest agility	5	15	17	15.	.837

Based on Table 2, it can be seen that the average pretest score for the male group is 12, posttest 15. The average pretest score for the female group is 12, posttest 15. This means that the agility posttest for the male and female groups is better than the agility pretest.

Table 3. Wilcoxon analysis results comparing pretest and posttest

Gender	Variable	Mean	difference	Significance	Decision
Male	Pretest agility	12	3	0.001	significant
	Posttest agility	15			
Female	Pretest agility	12	3	0.025	significant
	Posttest agility	15			

Based on the results of the Wilcoxon analysis, if the significance value is $p<0.05$, it can be said to be significant. Therefore, the result of significance in the male group is $0.001<0.05$, meaning there is a significant difference between the pretest and posttest scores with the difference in mean value being 3. The significance result in the female group is $0.025<0.05$, meaning there is a significant difference between the pretest and posttest scores The difference in the mean value is

3. Therefore, the reaction light-based training program has a significant influence on the agility of deaf badminton players.

4. DISCUSSION

The research aimed to test the effectiveness of a shadow training model based on reaction lights on the agility of badminton players with hearing disabilities. The results obtained were that there was a significant difference in the male group as evidenced by the significance value being 0.001<0.05 and the mean posttest value was better than the pretest with a difference of 3. The results obtained were that there was a significant difference in the female group as evidenced by the significance value being 0.025<0.05 and the mean posttest score was better than the pretest by a difference of 3. Therefore, the training program using reflection light-based shadows provided an increase in the agility of deaf badminton players.

Previous research using the shadow training method, a training frequency of 4 days a week for 12 weeks, had a positive influence on the physical parameters of badminton players aged 8-10 years (Fatih & Aydos, 2017). A recent study stated that the shadow training model is an effective method for increasing foot reaction speed and agility in handball players (Thambal et al., 2024). It is confirmed by several studies that shadow training provides the fact that it can improve the footwork ability and agility of beginner to advanced badminton players (Muthiarani & Yuniana, 2021; Rahman et al., 2020; Saputra, Wisnu & Sepdanius, 2019). Several studies show that the shadow method is a method favored by coaches to improve the agility of badminton players (Ihsan et al., 2023). This is proven again by technological advances to package the step application-based shadow method which provides evidence that it has a positive effect on the agility of badminton players (Ihsan et al., 2023).

Agility plays an important role in sports that require fast movements and changing direction without losing balance due to sudden stimuli (T. Tomoliyus & Sunardianta, 2020). Studies state that badminton players have fast, rhythmic, regular, and harmonious foot movements, which is one of the keys to success in winning matches (Fatih & Aydos, 2017). Therefore, to optimize performance improvement, programming training must be arranged more systematically. Of course, using contemporary methods (Hartono et al., 2017, 2024; Hidayah & Akhiruyanto, 2023). If we look at deaf badminton players, they must be given stimulus training that focuses on action and reaction movements through cue training models, real movement instruction, and reaction light media as the development of movement automation.

The trainer does not determine the flow of movement in an exercise but rather provides stimulus suddenly randomly with sudden instruction. This is called reactive agility (Yudhistira et al., 2021; Yudhistira & Tomoliyus, 2020; Zemková, 2016). Therefore, athletes can exert effort quickly, precisely, in balance without losing their level of focus (Yudhistira & Tomoliyus, 2020). The reaction light-based shadow training method is relevant to reactive agility in optimizing the physical performance of badminton players with sensory disabilities, especially the hearing impaired. Optimizing exercise programs requires using a touch of modern technology to get more optimal results. The sports system has shifted and implemented digital-based tools (Akhiruyanto et al., 2022). This makes it possible to optimize training methods to make them more sophisticated and more efficient (Akhiruyanto et al., 2022; Rohendi, 2020).

5. CONCLUSION

Based on the results and discussion, the author can conclude that providing a training program using the reaction light-based shadow method can increase agility in male and female deaf badminton players. Although the reaction light-based shadow method has a significant influence on agility, it needs further testing with more samples to get more comprehensive results

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