



The effect of playing 'Donat Playon' on physical fitness and agility of the students of Sadewo Junior Badminton School, Purworejo, Central Java

Amat Komari^{1*}, Zarizi ab Rahman², Ikhsan Kurniawan³

¹³ Faculty of Sports and Health Sciences, Universitas Negeri Yogyakarta, Indonesia

² Faculty of Education, Universiti Teknologi MARA, Malaysia

*Corresponding Author. Email: amatkomari@uny.ac.id

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Abstract: Badminton requires high levels of physical fitness and agility because players must perform rapid movements, acceleration, deceleration, and directional changes during match situations. However, conventional physical training approaches may provide limited engagement for junior athletes. Therefore, the development of game-based training models that integrate physical demands and enjoyable activities is needed. This study introduces Donat Playon as an innovative game-based training model designed to integrate agility, acceleration, and repeated directional movement demands in junior badminton training. This study aimed to examine the effect of Donat Playon game-based training on physical fitness and agility performance among junior badminton players. The study employed a quasi-experimental method with a one-group pretest-posttest design. The participants were 28 junior badminton players from Sadewo Junior Badminton School, Purworejo, Central Java, selected using purposive sampling. The intervention was conducted for three months consisting of 14 training sessions. Physical fitness was assessed using the multistage fitness test, while agility was measured using the shuttle run test. Data were analyzed using the Wilcoxon test with a significance level of 5%. The results showed significant improvements in both physical fitness and agility after participating in the Donat Playon training program. Physical fitness increased from a mean score of 31.65 ± 8.24 in the pretest to 34.64 ± 9.44 in the posttest, representing an improvement of 9.44% with a significance value of $p = 0.000$. Agility performance increased from 25.71 ± 6.48 to 27.68 ± 6.77 , representing an improvement of 7.66% with a significance value of $p = 0.002$. These findings indicate that Donat Playon provides effective movement stimuli through repeated running activities, rapid directional changes, and reactive movement patterns that are relevant to badminton-specific physical demands. In conclusion, the Donat Playon game-based training model can improve physical fitness and agility performance among junior badminton players. These findings suggest that Donat Playon can be considered an alternative badminton-specific conditioning approach that combines physical development with enjoyable training characteristics.

Keywords: donat playon; game-based training; physical fitness; agility; junior badminton players

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INTRODUCTION

Badminton is a widely popular sport globally (Kelimeler, 2017; Susiono et al., 2024; Milon & Milon, 2019; Pirak et al., 2021; Gómez-Rodríguez & Teixeira, 2024). Badminton is a sport that requires agility, since players must intercept the shuttlecock before it contacts the ground of the court (Milon & Milon, 2019; Pirak et al., 2021; Gómez-Rodríguez & Teixeira, 2024). The strokes executed are volleys (direct rebounds from the racket), necessitating excellent physical fitness and agility to pursue and strike the shuttlecock in a direction beyond the opponent's reach (Bozdoğan et al., 2017). Increased fitness correlates with greater oxygen consumption for metabolism, hence enhancing the endurance and stamina of students (Triyanto et al., 2021; Owen et al., 2004). According to the literature, badminton necessitates a synthesis of technique and physical fitness, encompassing strength, endurance, agility, speed, explosive power, and coordination (Bozdoğan et al., 2017; Ihsan et al., 2024). The growth of badminton students in Indonesia begins in childhood, continues during adolescence, and talented individuals progress to specialized badminton institutions. The identification of talented kids for participation in specialized badminton schools necessitates a

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series of evaluations, including fitness assessments, fundamental biomotor skills evaluations, anthropometric measurements, and badminton proficiency examinations (Susiono et al., 2024).

Badminton is a racket sport played by two or four individuals positioned on separate courts divided by a net (Subarkah & Marani, 2020; Hita, 2020; Wiratama & Karyono, 2017). Two participants for the singles division, and four participants for the doubles and mixed categories. The objective of badminton is for players to prevent the shuttlecock from landing on their own court and to return it over the net to the opponent's court as swiftly as possible, targeting areas that are challenging for the opponent to access. Agility in badminton is a crucial physical attribute that badminton students must possess to enhance their performance (Azmi & Kusnanik, 2018; Guo et al., 2020; Nugroho et al., 2021).

Currently, due to budget constraints, most of the children's physical activity is done through standard physical education programs in educational institutions (Bailey, 2006). Physical fitness is an important predictor of the current and future health status of badminton school students (Rubin et al., 2017). This study aims to present one of the physical training programs for badminton school students that is cheap to procure and easy to apply and certain key points underline the importance of maintaining physical fitness, which is not only relevant for badminton school students but also for the wider community.

Although various agility and physical conditioning programs have been developed for badminton athletes, many training approaches still rely on conventional drills that may reduce children's engagement during training sessions. Game-based training approaches provide an alternative method by combining physiological demands with motivational aspects. However, evidence regarding the effectiveness of badminton-specific game-based training models, particularly among junior badminton players, remains limited.

Therefore, the development and evaluation of Donat Playon as a game-based training model is important to provide an innovative approach for improving physical fitness and agility among junior badminton players.

MATERIALS AND METHODS

Research Design and Participants

This study employed a quasi-experimental method using a one-group pretest-posttest design to examine the effect of the Donat Playon game-based training program on physical fitness and agility performance among junior badminton players. The research consisted of three stages: pretest assessment, implementation of the training intervention, and posttest assessment.

The participants were 28 junior badminton players from Sadewo Junior Badminton School (SYP), Purworejo, Central Java. Participants were selected using purposive sampling based on the following criteria: actively participating in badminton training activities and having experience participating in badminton competitions at the Purworejo Regency level. All participants completed the pretest, intervention program, and posttest assessments. The characteristics of participants are presented in Table 1.

Table 1. Participant Characteristics

Characteristics	Description
Number of participants	28 junior badminton players
Institution	Sadewo Junior Badminton School (SYP)
Location	Purworejo, Central Java, Indonesia
Sport category	Junior badminton
Sampling method	Purposive sampling
Participant status	Active badminton trainees and competition participants

The research population was the students of SYP Badminton School, Central Java Province. The sampling technique in this study was carried out by using a purposive sampling technique, with 28 students participated with this research and the respondent selected for who active play badminton competitions in Purworejo Regency, Central Java. Prior to administering treatment to the students of Sadewo Yunior Purworejo (SYP) Badminton School in Central Java, a pretest assessing fitness and agility was performed utilizing a multistage test and shuttle run. Additionally, the intervention was administered over a period of 3 months utilizing the Donat Playon game. The intervention spanned a total of 14 sessions, occurring three times each week. Following the administration of the treatment, the

trainees underwent a posttest that utilized the Multistage test and Shuttle Run. The investigation took place between July and September of 2024. The treatment consisted of 14 sessions, scheduled three times a week on Tuesday, Thursday, and Saturday.

Training Intervention

The intervention was conducted using the Donat Playon game-based training model for approximately three months. The training program consisted of 14 training sessions conducted three times per week, scheduled on Tuesday, Thursday, and Saturday. The intervention was designed to improve physical fitness and agility through game-based movement activities involving repeated running, acceleration, avoidance movements, and directional changes. Templating pak amat komari

Each training session consisted of three main phases:

1. Warm-up phase
Participants performed preparatory activities before the main exercise to increase body readiness and reduce the risk of injury.
2. Main training phase
Participants performed the Donat Playon game activity as the main intervention. The activity was designed using badminton-specific movement characteristics, including acceleration, deceleration, repeated directional changes, and rapid movement responses.
3. Cool-down phase
Participants performed recovery activities after completing the main training activity.

The Donat Playon activity was conducted on a 10×10 meter field with a 1.5-meter track width. The game involved one player acting as the guard/catcher, while other participants attempted to avoid being captured while maintaining movement within the designated area. This activity required continuous movement, quick changes of direction, and rapid responses, which represent important components of badminton-specific agility.

Technique and Instrument of Data Collection

This study employed test and measurement approaches for data collection. The multistage test and agility test (shuttle run) were administered at the Gotong Royong Satu Hati Purworejo badminton court. Physical fitness was assessed using the Multistage test, while agility was evaluated through the Shuttle Run test. The acquired data were subsequently examined with the t-test methodology. The subsequent phase of data processing was facilitated using the IBM SPSS Statistics 26 tool.

The basis for making decisions the author's hypothesis uses the output of SPSS statistic 26 Wilcoxon non-parametric test. The basis for making decisions used in the Wilcoxon test is; 1). If the Asymp.sig value (2-tailed) <0.05 then Ha is accepted. 2). If the Asymp.sig value (2-tailed) > 0.05 then Ha is rejected.

Ha1: There is an effect of the donut playon game on improving the fitness of badminton students

Ho1: There is no effect of the donut playon game on improving the fitness of badminton students

Ha2: There is an effect of the donut playon game on improving the agility of badminton students

Ho2: There is no effect of the donut playon game on improving the agility of badminton students

Donat Playon Game-Based Training Model

The Donat Playon game was developed as a game-based training activity designed to improve physical fitness and agility performance among junior badminton players. The activity combines running-based movement patterns with badminton-specific physical demands, particularly acceleration, deceleration, directional changes, and rapid movement responses.

The Donat Playon game was performed on a 10 × 10 meter playing area with a 1.5-meter track width. The activity involved one participant acting as the guard/catcher, while the other participants attempted to avoid being captured by moving within the designated track area. During the game, participants were required to continuously move, change direction, accelerate, and decelerate according to the movement demands of the activity. Templating pak amat komari

The movement characteristics of Donat Playon incorporate repeated acceleration, deceleration, directional changes, and reactive movements, which represent important components of badminton-

specific agility. These movement patterns require participants to rapidly adjust body position, control movement speed, and respond to changing situations during the activity. Therefore, Donat Playon provides a training stimulus that combines physical conditioning elements with game-based characteristics, allowing athletes to develop movement abilities through an engaging and sport-relevant activity.

Unlike conventional physical conditioning drills that may emphasize repetitive movement patterns, Donat Playon integrates physical demands within a competitive and enjoyable game situation. This approach is expected to increase participant engagement while maintaining the movement intensity required to develop agility and physical fitness components relevant to badminton performance.

RESULT AND DISCUSSION

Result

The game of donat playon is a newly developed game by the researcher, driven by the aspiration to design a distinctive and engaging experience that not only brings joy to children but also enhances their physical fitness and agility. The donut playon game is categorized as a physically demanding activity, as its inherent characteristics involve that participants engage in running and constant movement within the designated area.

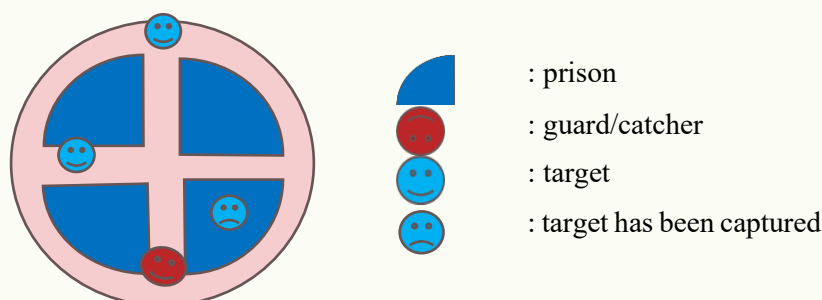


Figure 1. Donat Playon Field

Implementation procedures "Donut Playon" game exercise

Field Size and Game Overview

- Field Size; Area 10 x10 meters 1,5-meter track width
- 4-room center/prison cavity
- 10-15 students played, played in 1 set of 4 prisoners
- 1 guard/catcher and a minimum of 9 players/captured
- The guard chases the players and those caught are put in prison until 4 players are caught (1 set)
- Player is not allowed to leave the track while playing.

Statistic on The Descriptive Data

The attached data are the results of the pretest and posttest of students who participated in the Donut Playon game treatment.

Table 2. Data of pretest and posttest

	Fitness		Agility	
	Pretest	Posttest	Pretest	Posttest
Mean	31.65	34.64	25.71	27.68
Median	29.65	34.80	27.00	27.50
Standard of Deviation	8.24	9.44	6.48	6.77
Minimum	21.10	23.40	11.00	14.00
Maximum	54.00	56.00	36.00	39.00

The research findings indicate that modifications or enhancements were observed in the pretest and posttest outcomes for the mean, median, standard deviation, minimum value, and maximum value. The mean fitness value rose from 31.65 at pretest to 34.64 following the Donat Playon therapy. The mean data had an increase of 2.99 points, equivalent to 9.44%. Regarding agility, the pretest mean data increased from 25.71 to 27.68 following the Donat Playon therapy at posttest. Following the therapy with the Doanat Playon game, there was a rise of 1.97 points, equivalent to 7.66%.

The Normality Test assesses whether the data for each variable conforms to a normal distribution pattern. The author employs the Shapiro-Wilk method utilizing the IBM SPSS Statistics 26 application. If $p > 0.05$, the distribution is classified as normal; if $p < 0.05$, the distribution is classified as abnormal. The computation results are presented in the table 3:

Table 3. Normality Test

Variable	P	Sig.	Notes	
Research Data	Pretest of Fitness	0.014	0.05	Abnormal
	Postest of Fitness	0.034	0.05	Abnormal
	Pretest of Agility	0.094	0.05	Normal
	Postest of Agility	0.219	0.05	Normal

After the normality test, the author evaluates homogeneity to ascertain the comparability of the samples, specifically their uniformity. Homogeneity is determined using a conventional criterion: if the p-value is greater than 0.05, the data is considered homogenous; if the p-value is less than 0.05, it is deemed non-homogeneous. The outcomes of the homogeneity test align with the subsequent data;

Table 4. Homogeneity

F	df1	df2	Sig.
7,320	3	108	0,051

From the data in table 3, the significance level value is $0.051 > 0.05$ so that the data variance is homogeneous.

Table 5. Wilcoxon Test Results

Variable	Notes	N	Mean Rank	Sum of Ranks
PreTest– Posttest Fitness	Negative Rank	4	4.50	23.00
	Positive Rank	23	9.07	355.00
	Ties	1		
	Total	28		
	Asymp.Sig (2-tailed)	0.000		
Pretest- Posttest Agility	Negative Rank	4	12.00	48.00
	Positive Rank	21	13.19	277.00
	Ties	3		
	Total	28		
	Asymp.Sig (2-tailed)	0.002		

The Wilcoxon test for fitness yielded an Asymp.sig value (2-tailed) of 0.000, which is less than 0.05, indicating a significant impact of the donut playon game on the fitness of pupils at the SYP Junior Purworejo Central Java badminton school. In the agility data derived from the donut playon game, the Asymp.sig value (2-tailed) is 0.002, which is less than 0.05. The asymp.sig value (2-tailed) is less than the significance threshold of 0.05, indicating a significant effect of the donut playon game on enhancing the agility of children at the SYP Junior Purworejo Central Java badminton school.

Discussion

The importance of improving the physical condition of badminton players is fundamental to any training design. Physical fitness comprises a collection of features or characteristics inherent to an individual, pertaining to their capacity to engage in physical activities (Rubiyatno, Perdana, et al., 2023).

This condition pertains to the efficient collaboration of the body's systems (Boby, 2023; Rubiyatno, Sastaman B, et al., 2023). "Donut playon" is an enjoyable game, seen by the zeal and fervor of SYP junior badminton school pupils eager to participate. One student assumes the role of a guard pursuing a target, while others of his companion's sprint vigorously to evade capture. A circular field is divided into four halves by a track line that intersects it. Students engaged in donut playon can navigate the track while being pursued by the guard. Neither the guard nor the pursued is permitted to exit the designated track or field. When this game is played with seriousness and fervor, it is anticipated to enhance fitness and agility. Certain moves performed at high speed and involving abrupt changes in direction serve as agility training, enhancing muscular and cardiovascular endurance. In this game, agility is executed as a rapid directional change in reaction to inputs. Agility encompasses the concept of perceptual decision-making, necessitating alterations in movement direction and velocity in reaction to a stimulus (Thieschäfer & Büsch, 2022; Ahmed et al., 2019; Luna-Villouta et al., 2024). Agility encompasses many alterations to movement velocity, sensory perception, and precision in execution (Živković et al., 2021; Pamungkas et al., 2023). Modifications in trajectory and velocity are frequently employed in reaction to adversary actions. The significance of agility in badminton for selecting options and executing rapid movements when responding to the shuttlecock (stimulus) (Nugroho et al., 2021). Agility in badminton is essential for students to swiftly manoeuvre in multiple directions, whether to pursue or retain the shuttlecock within their court or to counteract attacks (Kuo et al., 2022; Panda et al., 2022).

The improvement in physical fitness and agility observed in this study may be attributed to the movement characteristics involved in the Donut Playon game. This activity requires repeated high-intensity movements, including acceleration, deceleration, rapid directional changes, and reactive responses. These movement patterns may stimulate neuromuscular adaptation, improve movement coordination, and enhance the ability to control body position during dynamic activities. Furthermore, the reactive nature of Donut Playon requires participants to continuously adjust their movements according to changing situations, which reflects the perceptual and decision-making components of agility. In badminton, these adaptations are important because players must rapidly respond to shuttlecock trajectories, change direction efficiently, and return to optimal court positions.

Humans are considered fit when they are healthy and capable of performing daily physical activity without undue weariness. To enable them to continue enjoying their daily lives and to resume activities (Mashud et al., 2024). When pupils possess strong physical fitness, they may effectively perform daily activities, enhance productivity, and derive greater enjoyment from life. The integration of consistent and high-quality physical activity yields positive effects (Hardinata et al., 2023). The effective pro-physical fitness movement, particularly among school-aged children, has been extensively noted. Children engaged in physical activities experience numerous psychological benefits, including lifestyle enhancement, social growth, cognitive advancement (Donnelly et al., 2016), and motor skill improvement (Samodra et al., 2023). Fitness is typically defined as a state of the body that enables the execution of physical activities without considerable weariness, while yet allowing for the performance of additional tasks. The Donut playon game can enhance the cardiovascular and pulmonary systems to optimize the body's metabolic functions. The constant and rapid running movement performed by the body can enhance the muscular strength of students. The donut playon game model is an exercise game that necessitates rapid movements to pursue or evade being pursued. The study's results align with the hypothesis, indicating a significant impact on student fitness following treatment with the donut playon game, as the Asymp.sig value (2-tailed) is 0.000, which is less than 0.05. It may be concluded that the donut playon game significantly influences the fitness of kids at the SYP junior badminton school in Purworejo, Central Java. The average fitness increased by 9.44%, rising from a pretest value of 31.65 to a post-treatment value of 34.64.

The donut playon training game which was held for 14 seasons showed an increase in agility in playing badminton which enhance agility by 7.99%. This agility is useful in making decisions and making quick movements when receiving the shuttlecock. Agility in badminton is essential for players to move quickly in all directions, either to catch or block the shuttlecock, preventing it from landing in their area of the court. In the donut playon game, participants must not only sprint swiftly but also navigate with agility. The findings from the donut playon game, based on speed, yielded an Asymp.sig value (2-tailed) of 0.002, which is less than 0.05. The Asymp.sig value (2-tailed) is less than the significance threshold of 0.05, indicating a significant effect of the donut playon game on enhancing

student agility. The pretest speed data was 25.71, which rose to 27.68 in the posttest following treatment with the donut playon game. The results of the Donut Playon exercise experiment show consistency with other studies which state that 12 weeks of functional-based physical exercise can significantly improve students' physical fitness. (Li et al., 2023). Additional studies indicated that consistent and quantifiable resistance and strength training can enhance physical fitness (Görner & Reineke, 2020). Furthermore, a six-month regimen of physical training can enhance cardiovascular respiratory capacity and upper limb muscular fitness in all pupils (Mashud et al., 2024). The previous research findings indicate that physical fitness is enhanced through specific physical exercises, implemented over a designated duration, and meticulously supervised by instructors or coaches. To enhance physical fitness effectively. Numerous research has disclosed multiple assumptions concerning physical fitness. Numerous research has demonstrated the truth of this assertion: engagement in sports positively influences physical fitness (Rubiyatno, Sastaman B, et al., 2023; Samodra et al., 2023; Görner & Reineke, 2020).

CONCLUSION

The findings highlight the important role of physical fitness and agility in badminton performance and demonstrate the effectiveness of targeted game-based training methods, such as the Donut Playon game, in improving these physical attributes among junior badminton players.

The Donut Playon game-based training program significantly improved physical fitness and agility performance among students at Sadewo Junior Badminton School, Purworejo, Central Java. After participating in 14 training sessions, participants demonstrated measurable improvements, with physical fitness increasing by 9.44% and agility performance improving by 7.99%.

These improvements may be related to the characteristics of the Donut Playon game, which involves repeated running movements, acceleration, rapid directional changes, and reactive movement responses. These movement demands are relevant to badminton because players are required to adjust body position quickly, respond to shuttlecock trajectories, and perform efficient movements during game situations.

The findings support the application of Donut Playon as an alternative game-based conditioning approach for junior badminton training programs. This training model combines physical development with enjoyable and competitive activities, which may help coaches and educators design engaging training environments that support the development of fitness and agility among young badminton players.

RESEARCH LIMITATION

This study was conducted with careful consideration; however, several limitations should be acknowledged. First, the participants were not accommodated in a training dormitory, meaning that the training process was limited to face-to-face sessions conducted at the badminton school. Therefore, activities and physical conditions outside the training sessions could not be fully controlled. Second, some parents or guardians initially perceived the Donut Playon activity as merely a recreational game rather than a badminton-specific training activity. This perception may influence support and understanding regarding the implementation of game-based training programs. Third, this study did not investigate additional factors such as psychological aspects, learning motivation, or cognitive development during the training process. Future studies may consider incorporating these variables to provide a more comprehensive understanding of the effects of game-based training models.

CONFLICTS OF INTEREST:

The authors declare no conflicts of interest.

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