COMPETITOR:
JURNAL PENDIDIKAN KEPELATIHAN OLAHRAGA
e-ISSN: 2657-0734 & p-ISSN: 2085-5389 || Volume 17, Number 3, 2025 || P.2185-2195

The Effect of Interval Training and Fartlek Training on VO2Max of MA Syekh Yusuf Futsal Extracurricular Participants in Motivation

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ABSTRACT

This study aims to find out: 1) To find out the difference in the effect of interval training and fartlek training on VO2Max in the high and low motivation groups, 2) To find out the interaction between exercise and motivation on VO_2Max, and 3) To find out which of interval training and fartlek training is more effective in increasing VO_2Max. The population is extracurricular participants of the MA Syekh Yusuf futsal. The sample used was 20 people. The sampling technique is total sampling and the ordinal pairing group division system. Study results: (1) There was a significant difference in the influence of participants who had high and low motivation on VO_2Max, (2) There was an interaction between exercise (interval training and fartlek training) and motivation (high and low) on VO_2Max, (3) There is a significant difference in influence between interval training and fartlek training, interval training is more effective in increasing VO_2Max. The conclusion that interval training has a greater influence than fartlek training on VO_2Max futsal extracurricular participants of MA Syekh Yusuf.

ARTICLE HISTORY
Received: 2025/07/16
Accepted: 2025/07/25
Published: 2025/10/02

KEYWORDS
Interval Training;
Fartlek Training;
VO_2Max;
Futsal;
Motivation.

AUTHORS' CONTRIBUTION
A. Conception and design of the study;
B. Acquisition of data;
C. Analysis and interpretation of data;
D. Manuscript preparation;
E. Obtaining funding

Cites this Article : Hidayat, Muh. Fahmi; Syahruddin, Syahruddin; Badaru, Benny; Irfan, Irfan; Hudain, Muh. Adnan. (2025). The Effect of Interval Training and Fartlek Training on VO2Max of MA Syekh Yusuf Futsal Extracurricular Participants in Motivation. **Competitor: Jurnal Pendidikan Kepelatihan Olahraga**. 17 (3), p.

INTRODUCTION

Futsal is a football sport played by two teams, each consisting of five main players on the field and ten reserve players. In futsal, there are various roles or positions that must be filled by players, including goalkeepers, defenders (anchors), wingers or midfielders (flanks), and forwards or strikers (pivots) (Suwardi et al., 2023).

In futsal, in addition to requiring high physical endurance, players must also be technically, tactically, and mentally prepared to achieve the best performance. Team defence strategy is one of the crucial aspects in futsal playing techniques, considering that this game requires rapid changes between attacking and defensive strategies (Badaru et al., 2022).

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To achieve high performance, intensive and continuous training is needed. Both team abilities and individual skills must continue to be honed, especially in terms of physical condition. Physical condition is an important element that cannot be separated from the achievement development process. The level of achievement of an athlete or player is greatly influenced by their physical condition, especially cardiovascular endurance. This endurance reflects the ability of the heart and lungs to support high-intensity and long-duration sports activities. Once cardiovascular endurance is achieved well, the next aspect that needs to be improved is the athlete's or player's competitive mentality.

One important aspect of cardiovascular fitness is VO2Max, which is a measure of the body's maximum ability to use oxygen during physical activity. A high VO2Max value reflects good aerobic capacity and optimal endurance, allowing futsal players to move quickly and efficiently throughout the match without getting tired easily. However, a common challenge often faced by extracurricular futsal participants at the school level is the low VO2Max value. This is influenced by several factors, such as the lack of adequate training intensity, minimal variation in training programs, and fluctuations in participant motivation. Monotonous and unstructured training often makes students lose interest, which ultimately hurts the effectiveness of their training and fitness development, especially in terms of increasing VO2Max.

VO2Max is a person's maximum ability to absorb and distribute oxygen throughout the body. This capacity is measured in litres per minute or millilitres per minute per kilogram of body weight. Every cell in the body needs oxygen to convert energy from food into ATP (Adenosine Triphosphate), which is the main energy source used in cellular activity. Muscles at rest use little oxygen, but when contracting, oxygen requirements increase significantly and are accompanied by the production of carbon dioxide (CO2). Oxygen requirements and the amount of CO2 produced can be monitored through the breathing process. By measuring the amount of oxygen used during exercise, we can find out how much oxygen is absorbed by the working muscles. The more muscles involved in the activity, the higher the intensity of the work (Basmi et al., 2018).

To overcome these problems, a training method is needed that is not only effective but also interesting, to increase VO2Max while maintaining participant enthusiasm. Two types of training that are considered appropriate and efficient in increasing VO2Max in futsal are interval training and fartlek training. Interval training is a method that is carried out with a repetitive pattern between intense activity and rest periods, for example, training-rest-training-rest, and so on. This was also expressed by Herlan & Komarudin (Dwitama & Wibowo, 2022). Interval training is a training method that involves repeating physical activity with rest breaks between each training session. It can be concluded that interval training is a training approach that combines repeated physical work with recovery time. The characteristic of this method is the existence of a consistent pattern of effort and rest time in each repetition. Several important components that need to be considered in compiling an interval training program include: training duration, training intensity or load, number of repetitions, and the length of recovery time after each repetition.

Interval training is a form of exercise that consists of active and passive recovery phases. The basic principle of interval training is to achieve certain goals through variations in several elements, namely the duration of the training load (such as distance travelled or number of repetitions), the intensity of the load (such as speed or volume of work), rest time between loads, and the type of rest taken during training. In its implementation, interval training distinguishes two types of rest: passive rest, such as sitting, standing, or lying down; and active rest, such as light jogging, walking, swimming slowly, or cycling slowly (Turi et al., 2023).

Interval training can be applied in various sports that require high endurance and stamina, such as athletics, basketball, volleyball, soccer, tennis, and futsal. In this method, rest time is done actively, for example, by walking, not passive rest such as stopping and standing still immediately after the activity. (Budi, 2018). Interval training is widely recommended by professional trainers because it has been proven to have a positive impact on increasing athletes' endurance and stamina (Irfan et al., 2023).

Interval running is a form of physical fitness training that is commonly done in the field. This training consists of running sessions interspersed with rest periods. The short duration of rest is adjusted to the training objectives, whether for low, medium, or high intensity. In compiling an interval running training program, there are several important factors that need to be considered, such as work duration (work interval), recovery time (relief interval), number of sets, repetitions, total training duration, long-distance training, and training frequency (Syahruddin et al., 2022).

Fartlek is a form of aerobic endurance training that combines elements of speed and strength. This exercise is designed to increase heart and lung capacity, as well as train the body's ability to adapt to sudden changes in intensity during physical activity. Meanwhile, according to Harsono (Dhuha et al., 2023) said that fartlek is a continuous training system interspersed with fast and slow running intervals as a form of recovery. This exercise is done by covering a relatively long distance while varying the running speed. These variations can start from jogging, then continue with short sprints, then full sprints, and are repeated periodically during the training session (Budi, 2018). Fartlek training, which combines high and low intensity through speed variations, reflects the rhythm of the futsal game, which tends to change. Because of the similarity of these patterns, fartlek can be an interesting and effective training alternative for participants.

Fartlek training is used to increase VO2Max and improve physical condition through a combination of walking, jogging, and running. Based on the observations of researchers, individuals who are accustomed to jogging at a slow and steady rhythm feel a challenge when trying fartlek, because this exercise combines jogging, sprinting, and walking in one session. The fartlek method is considered fun and effective in increasing the strength and aerobic capacity of athletes. The main principle of this exercise is variation in running speed, so that athletes can adjust the intensity according to their abilities and preferences (Tandek Sulingallo et al., 2022).

In addition to variations in training methods, participant motivation is also a key factor in the success of a VO2Max improvement program. A high level of motivation can

encourage participants to train with more enthusiasm and discipline, even though the training program is quite challenging. Conversely, low motivation can lead to a lack of commitment to undergoing training, which ultimately hinders the maximum improvement of physical fitness.

According to Ali Maksum (Kuspriyani & Setyawati, 2014), Motivation can be interpreted as an internal drive that drives a person to take action in a certain direction and intensity. According to Adisasmito, motivation is a combination of desires and goals that drive someone to behave or act.

Motivation is the main foundation for every effort and achievement in the field of sports. An athlete is motivated to continue to improve his performance, both in terms of physical and mental aspects, such as self-confidence, training intensity, focus, and emotional management. Achievement motivation is very important in the context of competitive sports, because it is the driving force to face challenges and complete difficult tasks faced in sports. In the training process and during competitions, athletes need motivational intervention to remain committed and highly motivated. In general, motivation is considered an important requirement to help athletes achieve their potential and best performance. In addition, because mental pressure tends to increase along with the high level of competition, the role of motivation in maintaining performance becomes increasingly crucial (Blegur & Mae, 2018).

METHODS

The research method used in this study is an experimental type or method using a factorial design design which is a development of true experimental design. This research will be conducted at the Syekh Yusuf Field and the Maestro Futsal Field, Gowa Regency. The population used in this study were 20 MA Syekh Yusuf futsal extracurricular participants. According to Arikunto (2010) said that, "If the subject is less than 100, then it is better to take all of them so that the research is a population research". The number of samples in this study was 20 people, using the total sampling technique, and the division of groups using ordinal pairing. The research instruments used in this study are: 1) Motivation test using a questionnaire, 2) VO2Max test using a bleep test. The data analysis technique used is hypothesis testing (ANOVA test); before that, a prerequisite test needs to be carried out. Testing of measurement data related to the research results aims to help the analysis be better. For this reason, in this study, normality and homogeneity tests will be applied.

RESULTS AND DISCUSSION

Result

The results of this study are a general description of several variables as supporters in the following discussion. The bleep test data used for analysis were those obtained by the samples when conducting the bleep test. The bleep test was carried out after the

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samples had completed the training process (treatment), namely interval training and fartlek training. Thus, the sample Bleep test value is the effect of the training process given. Furthermore, the bleep test data were analysed and presented in Table 1 below.

Table 1.
Descriptive Statistics of Pretest and Posttest VO2Max of MA Syekh Yusuf Futsal Extracurricular Participants

Training	Motivation	Statistic	Pretest	Posttest
Interval	High (A1B1)	Total	250.8	268.4
		Mean	50.16	53.68
		SD	0.7797	1.0354
	Low (A1B2)	Total	255.2	264.8
		Mean	51.04	52.96
		SD	1.6149	1.3145
Fartlek	High (A2B1)	Total	255.2	268
		Mean	51.04	53.6
		SD	0.9209	1.4967
	Low (A2B2)	Total	240.8	247.6
		Mean	48.16	49.52
		SD	1.3446	1.5849

The data was obtained and managed using the IBM Statistics 25 program. For more details, see below.

Data Normality test

The data normality test in this study used the Shapiro-Wilk method. The results of the data normality test carried out on each analysis group were carried out using the IBM Statistics 25 program with a significance level of 5% or 0.05. The complete results are presented in the appendix page. The data summary is presented in Table 2 as follows.

Table 2.
Data Normality Test

Group		p	Sig.	Information
Pretest	A1B1	0.758	0,05	Normal
	A1B2	0.708		Normal
	A2B1	0.257		Normal
	A2B2	0.994		Normal
Posttest	A1B1	0.501		Normal
	A1B2	0.858		Normal
	A2B1	0.235		Normal
	A2B2	0.305		Normal

Based on the statistical analysis of the normality test that has been carried out using the Shapiro-Wilk Z test, in all pretest and posttest VO2Max data, the results of the data normality test showed a significance value of $p > 0.05$, which means that the data is normally distributed.

Homogeneity Test

The homogeneity test is conducted to test the similarity of several samples, namely, homogeneous or not. The homogeneity test in question tests the similarity of variation between groups. The homogeneity test in this study is the Levene Test. The results of the homogeneity test are presented in Table 3 as follows.

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Table 3.
Data Homogeneity Test

Group	Levene Statistic	Sig.	Information
Pretest-Posttest	1.663	0.205	Homogen

Based on the statistical analysis of the homogeneity test that has been carried out using the Levene Test. In the pretest-posttest, a significance value of 0.205> 0.05 was obtained. This means that the data group has homogeneous variance. Thus, the population has the same variance or homogeneity.

Hypothesis Test

Hypothesis of the Difference in the Influence of VO2Max on MA Syekh Yusuf Futsal Extracurricular Participants Who Have High Motivation and Low Motivation

Table 4.
Results of ANOVA Test of Differences in the Influence of Participants with High and Low Motivation on VO2Max

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Motivation	28.800	1	28.800	15.254	0,001

From the results of the ANOVA test in Table 4 above, it can be seen that the significance value of p is 0.001 <0.05. Based on this, it means that there is a significant difference in the influence of VO2Max of MA Syekh Yusuf futsal extracurricular participants who have high and low motivation. Based on the results of the analysis, it turns out that participants with high motivation are higher (better) compared to participants with low motivation..

Hypothesis of Interaction of Training (Interval Training and Fartlek Training) and Motivation (High and Low) on VO2Max of MA Syekh Yusuf Futsal Extracurricular Participants

Table 5.
Results of ANOVA Test of Interaction between Interval Training and Fartlek Training and Motivation (High and Low) on VO2Max

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
Training*Motivation	14.112	1	14.112	7.475	0,015

From the results of the ANOVA test in Table 5 above, it can be seen that the significance value of p is 0.019. Because the significance value of p is 0.015 < 0.05.

Hypothesis of the Difference in the Effect of Interval Training and Fartlek Training, which is More Effective on VO2Max of MA Syekh Yusuf Futsal Extracurricular Participants

Table 6.
Results of ANOVA Test of Differences in the Effect of Interval Training and Fartlek Training on VO2Max

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Training	15.488	1	15.488	8.203	0,011

From the results of the ANOVA test in Table 6 above, it can be seen that the significance value of p is 0.011. Because the significance value of p is 0.011 <0.05. This

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shows that there is a significant difference in the influence of interval training and fartlek training on the VO2Max of MA Syekh Yusuf futsal extracurricular participants. Based on the results of the analysis, it turns out that the interval training group with an average difference of 2,720 is higher (good) compared to the fartlek training group of 1,960, with an average difference of 0.76.

Discussion

Differences in the Influence of VO2Max on MA Syekh Yusuf Futsal Extracurricular Participants Who Have High Motivation and Low Motivation

Differences in the Influence of VO2Max of MA Syekh Yusuf Futsal Extracurricular Participants Who Have High Motivation and Low Motivation results of the analysis show that there are significant differences in the influence of VO2Max on MA Syekh Yusuf futsal extracurricular participants who have high motivation and low motivation. Participants who have high motivation are higher (better) with an average of 53.640 compared to participants who have low motivation with an average of 51.240, with an average difference of 2.40.

Both interval training and fartlek training have similar goals, namely to increase cardiovascular endurance in order to boost a person's VO2Max value. However, based on observations, in individuals with high levels of motivation, interval training shows a more significant effect than fartlek training. According to Masni (Fadli et al., 2023), motivation is a form of energy change in an individual which is characterised by the emergence of emotional drive (feelings) and usually appears as a response to a goal that is to be achieved. According to Syahruddin et al. (2020), the motivation that a person has will give rise to a sense of readiness and willingness to try to achieve a goal.

(Guzel et al., 2020) Fitness has been shown to provide a positive contribution to individuals, not only physically but also spiritually. Regular physical exercise can improve mental well-being and generate motivation through feelings of comfort, pleasure, and relaxation. Sports activities can raise new hopes and desires in those who do them. This kind of drive is known as achievement motivation in sports, which is an internal force that drives a person to achieve success. This motivation plays an important role in helping athletes, both amateurs and professionals, realise their goals, hopes and even dreams, and has a big influence on the level of achievement in the field of sport.

Interaction of Training (Interval Training and Fartlek Training) and Motivation (High and Low) on VO2Max of MA Syekh Yusuf Futsal Extracurricular Participants

Based on the results that have been presented in the results of this study, there is an interaction between interval training and fartlek training with motivation (high and low) on VO2Max of MA Syekh Yusuf futsal extracurricular participants. The results of the study indicate that the interval training method group is a more effective method for participants who have high motivation, and the fartlek training method group is effective for participants who have low motivation.

The results are shown by pairs that have interactions or pairs that are significantly different (significant) are: (1) A1B1-A2B2, (2) A2B1-A2B2, (3) A1B2-A2B2, while other pairs

are stated to have no difference in influence are: (1) A1B1-A2B1, (2) A1B1-A1B2, (3) A2B1-A1B2. From the results of the interaction form, it appears that the main factors of the study, in the form of two factors, show significant interaction. In the results of this study, the interaction means that each group has a different influence on each group that is paired.

In the group of athletes with high motivation who were trained using interval training, they obtained better VO2Max results compared to the group of athletes with the same motivational abilities and trained using fartlek training. In line with Syahruddin and Latuheru (Fadli et al., 2023), who stated that motivation is a process that influences the level of activity, intensity, consistency, and direction of a person's behaviour in general. Based on the findings, the group of athletes with low motivation who followed the interval training program showed a more significant increase in VO2Max compared to the similar group who underwent fartlek training. However, the VO2Max value that has been achieved needs to be maintained through routine and continuous training because, according to Djoko in (Fadli et al., 2023), the level of fitness that has been achieved by a person can decrease gradually, even disappear completely, if the training is not done routinely and with the appropriate portion.

Differences in the Effects of Interval Training and Fartlek Training, which are More Effective on the VO2Max of MA Syekh Yusuf Futsal Extracurricular Participants

The results of the 2 x 2 analysis calculation on the difference in the effectiveness coefficient between the two training methods as a whole, namely Fcount between columns (FA) = 8.203, looks greater than = 3.10; it appears that Fcount> Ftable, or P-value = 0.011 <0.05. By looking at other results, the VO2Max ability using interval training with an average value = 53.320 and a standard deviation = 1.1783 compared to the results of the VO2Max ability of futsal extracurricular participants using fartlek training with an average value = 51.560 and a standard deviation = 2.5954, the results of the analysis turned out that the interval training group with an average difference of 2.720 was higher (good) compared to the fartlek training group of 1.960, with an average difference of 0.76. It is concluded that overall interval training is better than fartlek training in increasing VO2Max of MA Syekh Yusuf futsal extracurricular participants.

Increasing VO2Max ability can only be achieved through well-designed training. The application of the principle of progression, namely increasing the training load gradually in each session, is very important to maximise individual physical abilities. Conversely, if the training does not follow the correct basic principles, the results obtained tend to be less than optimal. Therefore, choosing the right training method - such as interval training - and providing the right training dose greatly influences the effectiveness of achieving goals. Interval training is effective in increasing VO2Max, as long as its implementation pays attention to the principles of training and is adjusted to the characteristics of each athlete (Sabransyah et al., 2020).

The interval training method has a significant effect on increasing VO2Max. As explained by Harsono in (Busyairi & Ray, 2018), Interval training is recommended by many

well-known coaches because it has been proven to have a positive impact on increasing athletes' endurance and stamina. In line with the findings of the research results, this training method has proven effective in increasing VO2Max capacity, so it can be used as one of the right training approaches in an athlete's cardiovascular fitness development program.

The fartlek training method has a significant effect on increasing VO2Max. According to Harsono (Busyairi & Ray, 2018), there are three basic forms of training that are recognised as effective in increasing cardiovascular endurance, namely continuous training (including fartlek), speed play training, and interval training. Among the three, fartlek training can provide significant results in increasing endurance if done consistently, structured, and in accordance with the correct training principles, as explained by Harsono in (Busyairi & Ray, 2018), Fartlek training with an intensity of around 70%, which is done three times a week for several weeks, has been shown to provide a significant increase in endurance. In line with the research results obtained, this fartlek method is effective in increasing the athlete's VO2Max capacity, as long as it is applied consistently and in accordance with the correct training principles.

CONCLUSION

After researching the problem of the influence of interval training and fartlek training on the VO2Max of MA Syekh Yusuf futsal extracurricular participants in terms of motivation, the following conclusions were drawn: there is a significant difference in the influence of participants who have high and low motivation on the VO2Max of MA Syekh Yusuf futsal extracurricular participants. Participants who have high motivation are higher (Good) compared to participants who have low motivation. There is an interaction between interval training and fartlek training and motivation (high and low) on the VO2Max of MA Syekh Yusuf futsal extracurricular participants. There is a significant difference in the influence between interval training and fartlek training on the VO2Max of MA Syekh Yusuf futsal extracurricular participants. The interval training group is higher (good) compared to the fartlek training group. In addition, interval training has proven to be more effective than fartlek training.

Based on the conclusions above, there are several suggestions that can be conveyed, namely: For players whose VO2Max is still low, they can improve it with interval and fartlek training. For coaches, they can use interval training to increase VO2Max because it is more effective. For further researchers to be able to conduct research considerations with other subjects, both in terms of the quantity and quality of participants.

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