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COMPARATIVE EFFECTS OF THREE TRAINING MODES ON THE PHYSICAL FITNESS REGARDING SPEED AND POWER OF UNDER 13 MALE SOCCER PLAYERS IN ALUU IKWERRE LGA OF RIVERS STATE

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ABSTRACT

This study was designed to compare the suitability of circuit, continuous and interval training programmes on the physical fitness attributes of U-13 male soccer players. The subjects were U-13 male soccer players who participated in football teams of their junior secondary schools' teams in Aluu, Ikwerre LGA of Rivers State Nigeria, post 2023/204 academic session. Fifty-four subjects were purposely drawn from 120 U-13 Amateur male soccer players. These Subjects were randomly assigned to three groups: circuit training group (A), continuous training group (B) and Interval training group (C) based on their possession of the actual ability and exponents suitable for the study. The exponents and ability include age, height, weight and participation in school junior team during the 2023/2024 academic session. Three school physical education instructors were trained as assistants for the execution of this work. The pre-test randomized group study design was used. The subjects were trained for four weeks using circuit, continuous and interval training regimens. Standardized, modified and physical fitness tests namely: 50mn dash and Sargent Jump were used for the physical fitness attributes. Two research questions and two hypotheses were formulated based on the effects of the three training programmes on speed and power levels of U-13 male soccer players. Mean and Standard Deviation were used to answer research questions while one way Analysis of Variance (ANOVA) was used to determine the level of significance at 0.05. The Least Significant Difference (LSD) post hoc pairwise comparison test was used to determine the direction of the difference for significant gain mean scores of the attributes under study. The results revealed that (1). Physical fitness attributes of U-13 male soccer players differed significantly due to the effect of circuit, continuous and interval training regimens. (2). Interval training regimen improved Speed when compared with circuit and continuos interval training regimens (3). The study showed that the, speed levels of U-13 male soccer players were not significantly affected by the training regimens irrespective of the positions they played while Power was significantly affected. Based on these findings, the researchers recommend among others that soccer coaches should use continuous and circuit training methods for developing

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Power, interval for Speed. It was also suggested that the study should be replicated using females, different sports and environment.

Keywords: Three Training Modes; Physical Fitness; Speed and Power; Under 13 Male Soccer Players

Introduction

The potential of athletes has been receiving a lot of attention by sports scientists who have used them primarily to evaluate, design and modify some training programmes (Blanke, et al, 2021). Zein, et al (2020) earlier stated that profiles have also been widely used to establish levels and develop in understanding of the physical make up of athletes competing in various sports.

Soccer is by far the most popular spectator sport in the world and in many countries, it is the most revenue yielding sport (Jose et al 2015). This popularity has stimulated numerous research efforts aimed at understanding the sport and the factors that promote excellence in it. It is played at amateur and professional levels. The standard of the game has developed tremendously over the years especially in Europe and South America. North America, Asia and Africa have started working hard to improve the standard of the game (Zein et al, 2020).

In modern soccer, teams are usually prepared to play what some coaches describe as "total football" consisting of mass attack and mass defense. In this type of soccer game, defenders can turn attackers and attackers can turn defenders when the need arises. This is a far cry from the old system of play in which the eleven (11) players made up of the goalkeeper, two full backs, three half backs and five forward line players had to maintain their positions on the field of play very rigidly. The system has since changed and players not only constitute themselves into different formations on the field but can over-lap and even exchange places on the field of play. Gil, (2007) emphasized that in the 4-2-4 formation for instance, we have the goalkeeper guarding the goal, four players playing the role of defenders, two midfield players and four attackers or strikers. Furthermore, in the 4-3- 3 formation, we have four defenders, three midfielders and three attackers. A team also experiments on other formations such as 4-4-2 and 2-4-4, depending on the objectives of the team for that match. It is also observed that in modern soccer even though players still specialize as defenders, midfielders, attackers and goalkeepers, every player is expected to know how to play the part of a defender or an attacker as a rule. Ability to play one or more positions is determined by the physical fitness status of an individual.

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Furthermore, in modern soccer, all the players with expectation of the goalkeeper can switch positions tactically such that the defenders can occasionally overlap to become midfielders or even attackers (Boyaci & Afryo, 2017). Based on the foregoing explanations, the study is focused on determining which of three training methods would be suitable for the development of the physical fitness attributes of U-13 male soccer players in Aluu Ikwere LGA of Rivers State based on their playing positions.

Statement of the Problem

Fitness and conditioning factors are aspects of the scientific variables being utilized by developed countries to improve the standard of soccer game, this is affirmed by Ajiduah (1992), as he emphasized that the standard of soccer game has developed tremendously over the years, especially in Brazil, Argentina and entire South America due to the application of physical fitness and conditioning variables during the training programme. It has been observed that in modern soccer, the standard of performance for some Nigerian home-based soccer players appears to be very poor compared to their counterparts in the developed countries of the world. The level of physical fitness of a player makes the difference in his or her ability to sustain performance at high level in a game situation. Vardakis, et al, (2020) stated that enough physical fitness training both aerobic and anaerobic have not been included in the training programme of Nigeria football teams. He further stressed that soccer teams in Nigeria mostly concentrate training efforts on techniques, tactics and co-ordination hoping that physical fitness attributes should be developed as well. This study is designed to fill the gap in knowledge about the effectiveness of different training modes on the physical fitness attributes of amateur soccer players in Aluu, Rivers State of Nigeria.

Purpose of the Study

The purpose of this study was to compare the suitability of circuit, continuous and interval training programmes in the development of physical fitness attributes of U-13 male soccer players based on their playing positions.

Specifically, the study aimed at:

1. Finding out the effectiveness of circuit, continuous and interval training programmes on the speed of U-13 male soccer players.
2 Identifying the effectiveness of circuit, continuous and interval training programmes on the power of U-13 male soccer players.

Significance of the Study

This study will be helpful to sports handlers especially coaches to understand that training for physical fitness is among the key element to excellent performance in soccer. The results of this study could help the coaches in identifying the usefulness of a particular

training method in relation to the specific physical fitness attributes. The result of this study could guide coaches in designing or modifying effective training regimen that could help players establish and maintain physical fitness levels required for soccer performance during the preparatory phases. Furthermore, this study could equally help coaches as well as the players to reassess their training techniques and opt for the best. The study could also help to improve the general health of the individual players, as the chances of suffering exhaustion will be limited during the actual play. It will also help in the development of confidence among the sports handlers and the players themselves. The result of this study can not only help to develop the physical fitness potentials of the players, but also could help in blending such qualities into effective team work and finally help coaches and players maintain high standard of performance in soccer in Nigeria.

Scope of the Study

Many scientific variables for preparation of soccer players such as Psychological, Biomechanical, Nutritional, Sociological, Physical fitness and Conditioning variables are available. However, the present study is limited to only physical fitness components as one of the scientific variables. The study is focused on the U-13 male soccer players in Aluu Rivers State who participated in school football team during the 2023/2024 academic session.

Research Questions

The following research questions guided the conduct of the study

1. What effectiveness would the circuit, continuous and interval training programmes have on the Speed of U-13 male soccer players?
2. What effectiveness would the circuit, continuous and interval training programmes have on the Power of U-13 male soccer players?

Hypotheses

The following null hypotheses were postulated for the study at 0.05 level of significance.

1. The effectiveness of circuit, continuous and interval training programmes on the Speed of U-13 male soccer players do not differ significantly.
2. The effectiveness of circuit, continuous and interval training programmes on the Power of U-13 male soccer players do not differ significantly.

Research Method

Research Design: This study utilized experimental research design. It was used so as to investigate the cause-and-effect relationship that existed between the independent and dependent variables for the study. Specifically, laboratory type of experimental research design was adopted for this study. In this design according to Kendall (2003), subjects are studied in a closed

setting so that researchers can maintain as much as control as possible over the subjects. It was a pre-test, post-test randomized group study, designed to determine the effectiveness of three training programmes on the physical fitness of U-13 male soccer players based on their playing positions. Three groups of subjects were involved in the study, each group comprised attackers, midfielders, defenders plus goalkeepers. The three groups were exposed to the different experimental treatments. There was no control group.

Area of the Study: The area of the study was Aluu Ikwerre LGA of Rivers State which comprises some. The study specifically centered on the towns within five (5) kilometers radius.

Population of the Study: All the 120 U-13 male soccer players within Aluu community who participated in their school football team in the 2023/24 academic session. Constituted the population for the study. These players were involved in this study because the group constituted a homogenous unit of skillful players fit for grassroots development of dependable soccer players for local and international soccer competition.

Sample and Sampling Technique: Purposive sampling technique was adopted in selecting the subjects for the study. The researcher adopted this technique because it is the most appropriate for the study. In purposive sampling technique, specific elements which satisfy some pre-determined criteria are selected and the criteria used are usually based on the researcher's judgment (Nworgu, 1991). The researcher exercises this judgment in relation to what constituted a representative sample with respect to research purpose. Therefore, purposive sampling technique was adopted in the sense that the subjects possessed the required characteristics suitable for the sample of the study such as age, height, weight (exponents) and participation in school team. Anambra State. Fifty-four (54) out of 120 U-13 male soccer players were sampled by means of this sampling technique.

Instrument for Data Collection: Modified and standardized physical fitness tests were the main instruments used in collecting the data for the study.

These comprised:

i. 50m dash
ii. Sargent Jump

In addition, six training exercises suitable for the development of physical fitness attributes each in circuit training, interval training and continuous training were also used as data collecting instruments for the study. Furthermore, standard soccer pitch, stop watches, cones, pen, paper, six standard footballs, tag numbers, graduated ruler, red and white flags, dumbbells and whistle formed part of the instrument. A data sheet named Physical Fitness Conditioning Assessment Sheet (PFCAS) was developed by the researcher and used in collecting the final data for the physical fitness level of the subjects.

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Validation of the Instrument: This study adopted two already standardized physical fitness test items which their validity has been established worldwide as stated by American Association of Health, Physical Education, Recreation and Dance (1988).

Reliability of the Instrument: To ensure the reliability of the modified instruments for the study, test-retest method was applied using the trial run group. The scores were correlated using Pearson product moment correlation coefficient, The scores from the tests yielded reliabilities co-efficient of 0.939, 0.893, 0.993 and 0.986 respectively for modified Coopers endurance run, sit and reach, Illinois agility run and pushups, thus indicating a good degree of reliability. These estimates were considered high enough for adopting the instruments for the study.

Method of Data Collection: The subjects were assembled at the standard football pitch. A pre-test was given to all the subjects in the three groups before the administration of the treatment. The treatment sessions lasted for eight weeks. At the end of the eight weeks of training, post-test was administered using pre-determined criteria.

Assigning the Subjects to Treatment Groups: The researchers assembled the fifty-four (54) subjects and randomly assigned them to the groups using the pre-test scores. In addition, the three groups were assigned to the three training programmes namely circuit training group, interval training group and continuous training group using balloting technique.

Method of Data Analysis: Mean scores and standard deviations were used in answering the research questions. The hypotheses were tested using one way analysis of variance (ANOVA) at 0.05 alpha level. ANOVA was suitable in testing the hypotheses since it serves as a procedure for determining the contingencies of multiple means which involves two independent estimations of the population variance. It is equally used in checking the homogeneity of variance between two samples. Oyeka (1992) emphasized that ANOVA is used for partitioning the total variation of a set of data into several components

Presentation and Analysis of Data

The main purpose of the study was to identify the effectiveness of the training methods on the physical fitness attributes of U-13 male soccer players based on their playing positions, the results of the analysis of data for the study were presented. The results attempted to answer the research questions and tested the hypotheses postulated for the study.

Decision Rule: The null hypothesis (Ho) is rejected if the probability value (p-value) given by the computer is less than the chosen significant level (α), that is 5% or 0.05.

Research Question 1: What effectiveness would the circuit, continuous and interval training regimens have on the Speed of U-13 male soccer players?

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The mean and standard deviation data presented on Table 1 below provided answer to the research question.

Table 1: Means and Standard Deviations of U-13 Male Soccer Players Using Gain on Speed

Players position	Circuit Training			Continuous Training			Interval Training			Total		
	X	SD	N	X	SD	N	X	SD	N	X	SD	N
D	0.2880	0.43517	5	0.2920	0.35287	5	1.0680	0.08468	5	0.5493	0.48564	15
A	0.3900	0.20676	5	0.3640	0.23702	5	0.6560	0.24214	5	0.4700	0.25233	15
M	0.7525	0.19602	4	0.3175	0.46111	4	0.9075	0.16070	4	0.6592	0.37888	12
G	0.2225	0.21422	4	0.1750	0.15610	4	1.0200	0.06055	4	0.4725	0.42904	12
Total	**0.4050**	**0.33142**	**18**	**0.2917**	**0.289731**	**18**	**0.9072**	**0.22326**	**18**	**0.5346**	**0.64591**	**54**

From the summary of the result on table 1, it can be observed that interval training group had the highest mean gain score of 0.9072 with standard deviation 0.22326, followed by circuit training group 0.4050 with standard deviation 0.33142 and lastly continuous training group 0.2917 ± 0.29873. This means that interval training regimen improved speed of U-13 male soccer players as against to circuit and continuous training regimens.

Hypothesis 1. The effectiveness of circuit, continuous and interval training programmes on the Speed of U-13 male soccer players do not differ significantly.

Analysis of variance (ANOVA) was used in testing this null hypothesis at 0.05 confidence level and the results obtained are summarized on table 2 below.

Table 2: ANOVA Summary on the Effectiveness of Circuit, Continuous and Interval Training Programmes Using Gain in Speed of Players.

Source	SS	Df	Ms	F*	P-value	Decision
Type of Training Programme	3.894	2	1.947	27.562	0.000*	S
Position of Players	0.298	3	9.944E-02	1.408	0.254	NS
Error (within treatment)	2.967	42	7.064E-02			

* P < 0.05

From the result of the data in Table 2, it can be deduced that the calculated value of f for type of training group (27.562) had a p-value (0.000) which is less than the significant level

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that is 0.05. The same table also showed that calculated f value for position of players (1.408) had a p-value 0.254 which is greater than 0.05 alpha level. It is therefore necessary to reject the null hypothesis for the type of training group and accept it based on the playing positions of U-13 male soccer players. The implication is that the speed of U-13 male soccer players differed significantly irrespective of the positions they play. In order to determine the pairs of mean gain scores in the type of training regimens which were significantly different, post hoc pairwise comparison was conducted using least significant difference (LSD) test. The results of this test are summarized on Table 3.

Table 3: LSD Pairwise Comparison on the Effectiveness of Circuit, Continuous and Interval Training Programmes on Speed of Players.

S/N	Training Programmes	X	X Difference	P-value	Decision
1	Circuit	0.413	0.126	0.164*	S
	Continuous	0.287			
2	Interval	0.913	0.626	0.000*	S
	Continuous	0.287			
3	Interval	0.413	0.500	0.000*	NS
	Circuit	0.913			

The result on table 3 revealed that the calculated p-values of least significant difference pairwise comparison of circuit and interval (0.000), interval and continuous (0.000) were less than 0.05 level of significance while that of circuit and continuous 0.164 was greater than 0.05. This implies that the interval training regimen enhanced speed of U-13 male soccer players when compared to circuit and continuous training regimens.

Research Question 2: What effectiveness would circuit; continuous and interval training regimens have on the power of U-13 female soccer players?

The results obtained on this research shown on Table 6. Mean and standard deviation were used for the analysis.

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Table 4: Mean and Standard Deviations of U-13 female Soccer Players Using Gain in Power

Players position	Circuit Training			Continuous Training			Interval Training			Total		
	X	SD	N	X	SD	N	X	SD	N	X	SD	N
D	3.8000	0.69642	5	3.8600	0.63087	5	3.4400	0.28810	5	3.7000	0.55934	15
A	3.2800	0.56303	5	3.6000	0.68920	5	2.7200	0.52631	5	3.2000	0.66869	15
M	2.7500	0.47958	4	3.0250	0.51881	4	2.3500	0.23805	4	2.7083	0.48516	12
G	3.9250	0.62383	4	4.4750	0.49917	4	2.8000	0.18257	4	3.7333	0.84459	12
Total	**3.4500**	**0.71476**	**18**	**3.7389**	**0.74450**	**18**	**2.8556**	**0.51703**	**18**	**3.3481**	**0.75159**	**54**

From the overall result of the analysis on Table 4, continuous training group had the highest mean gain scores, followed by circuit training group and lastly interval training group. Their mean gain scores with standard deviations were as follows 3.7389 ± 0.74450, 3.4500 ± 0.71476 and 2.8556 ± 0.51703. It implies that continuous and circuit training groups had better effectiveness than interval training group.

Hypothesis 2: The effectiveness of circuit, continuous and interval training programmes on the power of U-13 male soccer players do not differ significantly.

This hypothesis was tested using one way analysis of variance (ANOVA) at 0.05 alpha level. The results obtained are summarized on Table 5 below.

Table 5: ANOVA Summary Using Gain in Power due to Effectiveness of Circuit, Continuous and Interval Training Programmes

Source	SS	Df	Ms	F*	P-value	Decision
Type of Training Programme	7.686	2	3.843	13.653	0.000*	S
Position of Players	8.879	3	2.960	10.514	0.000*	NS
Error (within treatment)	11.823	42	0.281			

* P < 0.05

The result from the data on table 5 indicated that the type of training groups had f calculated 13.653 and a p-value of 0.000 which is less than 0.05 alpha level. Therefore, the null hypothesis is rejected for type of training programme. In addition, this table also showed that player's positions had f calculated 10.514 and a p-value (0.000) which is also less than 0.05. The hypothesis is also rejected for the position of players. It

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is therefore logical to conclude that there is significant difference on the power of U-13 male soccer players due to the effect of the three training regimens (circuit, continuous and interval) and also based on the playing positions of the players. To determine the direction of pairs of mean gain in the type of training regimens which were significantly different, post hoc pairwise comparisons were conducted using least significant different (LSD) test. The results are summarized on table 6.

Table 6: LSD Pairwise Comparison on the Effectiveness of Circuit, Continuous and Interval Training Programmes on the Power of U-13 Male Soccer Players

S/N	Training Programmes	X	X Difference	P-value	Decision
1	Circuit	3.439	0.301	0.098	NS
	Continuous	3.740			
2	Interval	2.827	0.913	0.000*	S
	Continuous	3.740			
3	Interval	3.439	0.612	0.001*	S
	Circuit	2.827			

* P < 0.05

When a least significant different (LSD) post hoc pairwise comparison test was conducted, it was observed as shown on table 18 that p-values of circuit and interval training groups 0.001, continuous and interval 0.000 were less than the chosen significant level thus 0.05 while that of circuit and continuous 0.098 was greater than 0.05. This implies that continuous and circuit training groups had better power mean gain scores than interval training group.

Summary of Major Findings

The findings of this study are summarized as follows:

1. Physical fitness attributes of U-13 male soccer players differ significantly due to the effectiveness of circuit, continuous and interval training programme.
2. The speed level of U-13 male soccer players is not significantly influenced by the training regimens irrespective of the positions they play.
3. Continuous and circuit training groups had better power than interval training group.
4. The power of U-13 male soccer players is significantly affected by the training programmes based on their playing positions.

Discussion, Conclusions and Recommendations

The purpose of the study was to determine the effects of circuit, continuous and interval training programmes in the development of

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physical fitness attributes of U-13 male soccer players. These physical fitness attributes include Speed and Power. The findings of the study are discussed in this chapter. Also highlighted are the conclusion, recommendations, implication of the study, limitation of the study and suggestions for further research.

Discussion

The Effectiveness of Circuit, Continuous and Interval Training Regimens in the Development of Speed in U-13 Male Soccer Players.

The finding showed that the mean gain scores in speed of U-13 male soccer players were better in the interval training group than in the circuit and continuous training groups. This implies that interval training regimen facilitated the development of speed more than the circuit and continuous training regimens. This engendering as stated by Nitti and Nittí (2002) could be as a result of shorter bouts of lower and higher intensity with repeated high-level stressing of anaerobic systems in the selected exercises for interval training regimens.

Nevertheless, the finding equally revealed that the speed of the U-13 male soccer players do not differ significantly irrespective of their playing positions. This implies that speed is basically required for all the playing positions. This finding agreed with Fitness for Soccer (2005) that speed is an integral part of training for all players and can help all players successfully perform the following soccer movements: dribbling, reacting tacklers, chasing the opponent, changing direction quickly, reacting to situations, start and stop effectively, retreating to referees and assistant referees command and avoiding injury.

The Outcome of Using Circuit, Continuous and Interval Training to Develop U-13 Male Soccer Players Power Ability

The analysed data revealed that continuous and circuit training groups had better power ability than the interval training group. The superiority could be attributed to the fact that continuous and circuit training regimes mostly improve aerobic endurance of which power and muscle strength are the major components. This agreed with the view of Carrol and power and Mendoza (1998) that muscle strength, cardiovascular systems are the components of endurance. During circuit and continuous training of repetitive exercise or several weeks, the muscles adapt to general force (power) and maintain the supply of energy which is needed to move a resisting object a specific distance within a limited period of time.

Conclusions

Based on the findings of this study, the following conclusions were drawn.

1. Circuit, continuous and interval training programmes were found significant ($P<0.05$) in terms of

enhancing U-13 male soccer players physical fitness attributes.
2. Interval training group had better Speed ability of U-13 male soccer players when compared to continuous training group.
3. Interval training group had better Speed ability than circuit and continuous and training groups.
4. The Speed level of U-13 soccer players is not significantly influenced by the training regimens irrespective of the positions they play.
5. Continuous and circuit training groups had better Power ability than interval training group.
6. The Power level of U-13 male soccer players is significantly affected by the training programmes based on their playing positions.

Recommendations

Sequel to the result of this finding, the researcher deems it necessary to recommend the following;

Soccer coaches should enforce physical fitness training of players as the basic training programme for soccer players.

Coaches should also use continuous and circuit training regimens for developing endurance and power abilities, interval for speed ability while interval and circuit training regimens should be used for flexibility, agility and strength abilities development.

Coaches should try as much as possible to adopt the seven-training guide for building physical fitness suggested by Total Soccer Fitness (2005). This includes aerobic and anaerobic endurance conditioning, programme of different preparation of strength and power agility conditioning, flexibility conditioning, speed and conditioning, warming up and cooling down, testing soccer fitness and planning your soccer conditioning programme.

Well-trained physiologists should be employed to help in planning, monitoring, supervising and evaluating the training categories of soccer players.

Coaches and sports scientists should also plan the training programme based on the specific requirements of the soccer playing positions. On this issue knowledge of the physiological requirements of the playing positions becomes paramount for the coaches. Coaches should also try as much as possible to follow the basic principles of training such as specificity, overload, intensity, progression and recovery during training periods.

Emphasis should be made by the coaches to know the particular period suitable for physical fitness training, whether during early pre-season, late pre-season, early in-season, late in season or off season.

Sports governing body should establish a policy that should guide the setting of tests for grading of national soccer coaches based on the different level of competition such as 13, U-17 and U-21.

Sports governing body should equally plan to send the national coaches for courses abroad so that they should acquaint themselves with the scientific approaches for training soccer players.

Sports ministries in collaboration with soccer clubs' management bodies should make effort to organize seminars/workshops for coaches on the important of building physical fitness attributes of soccer players.

Implication of the Study

The result of this study has some implications for physical education and sports programme. It has provided empirical evidence as to the relative efficacy of the development of soccer players physical fitness attributes using circuit, continuous and interval training regimens. This suggests the need for coaches and sports scientists to adopt the new approach of training soccer players in physical fitness before going into techniques, skills and tactics involved in soccer game.

The study has also shown that there is significant improvement in the use of circuit, continuous and interval training regimens in the development of physical fitness attributes of soccer players. Therefore, this called for soccer coaches to start from the grass root to introduce the use of these training programmes so as to build the physical fitness attributes of soccer players thereby improving the standard of soccer performance in the state and Nigeria in general.

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