ISSN: 2527-9580 (print)
ISSN: 2579-7662 (online)

Jendela Olahraga
Volume 09, No. 02, July 2024, pp. 9-19
DOI: http://dx.doi.org/10.26877/jo.v9i2.18638

The Effect of Cognitive Training on the Concentration of High Intellectual Athletes in *Open-Skill* Sports

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ARTICLE INFO

Article history
Received 2024-03-14
Revised 2024-06-16
Accepted 2024-07-11

Keywords

Brain Gym
Concentration
High Intellectual
Life Kinetic
Open Skill

ABSTRACT

This research discusses cognitive training (life kinetic and brain gym) on the concentration of high intellectual athletes in open skill sports. The aim of this research is to determine the effect of cognitive training (life kinetic and brain gym) on the concentration of high intellectual athletes in open skill sports and to determine the difference in the influence of life kinetic and brain gym training on the concentration of high intellectual athletes in open skill sports. The method used in this research is the experimental method. The population used was 48 athletes in open skill sports. The sample consisted of 21 athletes taken using purposive sampling technique. The instruments in this study used the Advanced Progressive Matrices (APM) Test and the Concentration and Focus Skill Test (CGT). The data analysis technique used is the Paired Sample t-test and the Independent Sample t-test. The results of this study show that there is a significant influence of life kinetic and brain gym training on the concentration of high intellectual athletes in open-skill sports and there is no significant difference in influence between life kinetic training and brain gym training on the concentration of high intellectual athletes in open-skill sports.

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Kata kunci
Brain Gym
Intelektual Tinggi
Konsentrasi
Life Kinetik
Open Skill

Abstrak

Penelitian ini membahas mengenai latihan kognisi (life kinetik dan brain gym) terhadap konsentrasi atlet intelektual tinggi pada cabang olahraga open skill. Tujuan penelitian ini untuk mengetahui pengaruh latihan kognisi (life kinetik dan brain gym) terhadap konsentrasi atlet intelektual tinggi pada cabang olahraga open skill dan untuk mengetahui perbedaan pengaruh latihan life kinetik dan brain gym terhadap konsentrasi atlet intelektual tinggi pada cabang olahraga open skill. Metode yang digunakan dalam penelitian ini adalah metode eksperimen. Populasi yang digunakan sebanyak 48 atlet cabang olahraga open skill. Sampel berjumlah 21 atlet yang diambil menggunakan teknik purposive sampling. Instrumen pada penelitian ini menggunakan Tes Advanced Progressive Matrices (APM) dan Concentration and Focus Skill Test (CGT). Teknik analisis data yang digunakan yaitu Uji Paired Sample t-test dan Uji Independent Sample t-test.Hasil dari penelitian ini menunjukan bahwa Terdapat pengaruh yang signifikan latihan life kinetik dan brain gym terhadap konsentrasi atlet intelektual tinggi pada cabang olahraga open-skill dan Tidak terdapat perbedaan pengaruh yang siginifkan antara latihan life kinetik dengan latihan brain gym terhadap konsentrasi atlet intelektual tinggi pada cabang olahraga open-skill.

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INTRODUCTION

Concentration is the ability of sportsmen to maintain the focus of their attention in a relevant

match/competition environment, it is also stated that, concentration includes mental aspects in sports and plays an important role in the match/competition. Reduced or disrupted concentration of athletes during training and even more so during matches / competitions, will cause various kinds of fatal problems and non-optimal results. All sports require concentration (Kadir et al., 2023). "*The most basic problems for adolescents may occur in physical and psychological components, including physical, which contains arm muscle endurance and balance, and from the psychological aspect, namely concentration"* (Yachsie et al., 2023). Based on some of the quotes above, concentration can be categorized as one of the important aspects that must be possessed by athletes during matches / competitions in order to perform optimally when on the field. psychological factors are very important to understand cognitive processes when practicing and competing, cognitive abilities play an important role in determining the success of competing performances in each individual and team, it is very clear that intellectual intelligence greatly supports athlete performance when competing. (Minarni et al., 2019).

Intelligence is one of the factors to determine the potential of students who are able to achieve in turning the difficulties of life's tough challenges into gifts and opportunities for success. (Heryadi, 2021). The intelligence in question is the intelligence to think quickly and precisely, act quickly to anticipate opponents, therefore this condition is closely related to sports in order to continue to increase properly must continue to obtain stimulus or stimulation to function, in a way that the athlete must be accustomed to using his intellectual abilities (Fazari et al., 2017). (Fazari et al., 2017).

Study conducted by Wang et al. (2013) said that *"Open skill sports are defined as those in which players are required to react in a dynamically changing, unpredictable and externally-paced environment (e.g., basketball, tennis, fencing and etc.). Athletes from open skill sports may develop more flexibility in visual attention, decision making and action execution, relative to athletes from closed skill sports. This rationale can be supported by meta-analysis studies that showed that athletes from open skill sports (also referred to as interceptive or strategic sports) performed better in cognitive tasks than those from closed skill sports".* From the explanation above, sports that are included in *open skill* sports require very high concentration to react dynamically during the game, because the opponent's movements cannot be predicted. Athletes from *open skill* sports must also have a high intellectual level, because it is very influential when dealing with opponents in the field, where athletes must be quick in making decisions when attacking (*passing, shooting*) or when defending must be able to read the opponent's movements very quickly. Before carrying out the match, athletes describe the structure of their preparation strategy when training as a list of mental or physical items that they feel must be completed before their performance begins when competing. (Bonk & Tamminen, 2022)..

Based on the explanation above, namely the intellectual concentration of athletes, it is necessary to have a psychological training model that is able to increase concentration on athletes' intellectuals. Researchers took the initiative to take the *Life Kinetic* and *Brain Gym* training methods. *Life kinetics* is

a modern technical action training program based on the formation of locomotive habits paired with high activity of the nervous system - especially the intelligence of athletes. The method has been spread (in soccer training) by Horst Lutz, a German association of soccer coaches. (Duda, 2015). While *kinetic life* according to Cakir et al. (2020) is a new training model developed to maintain the mental and physical capacity of athletes at all times. It is stated that it will have a significant developmental effect on focus, reaction and ability to overcome difficulties, especially in childhood, adolescent and adult athletes.

Brain Gym is a structured non-aerobic physical exercise intervention in which a combination of specific patterns of crossed movements of the head, eyes, and extremities are performed in conjunction with brain and breathing exercises (Cancela et al., 2015). Meanwhile, according to Pratiwi & Pratama (2020) *Brain Gym* contains simple movements using the whole brain. *Brain Gym* can release hidden potential through body movements. Brain gym is a series of simple movements that are fun and can help develop the brain, both in coordination of the eyes, hands, ears and all the body. (Widanti et al., 2021). Based on the understanding explained above, the two exercises can be implemented to improve the concentration and intellectual abilities of athletes.

This research must be done because *open skill* sports are dynamic sports, where athletes are required to have good concentration when playing in order to read the movements of opponents that cannot be predicted, therefore it is necessary to have special treatment for *open skill* athletes to improve athlete concentration. The benefits of the cognition training model, especially through the *kinetic life* training model and *brain gym* to improve psychological aspects such as concentration. Previous research conducted by Pratiwi & Pratama (2020) said *brain gym* was able to have a positive impact on student concentration, then research conducted by Mulyadi et al. (2021) said that *kinetic life* training can improve the concentration of soccer athletes. Researchers have not seen any research that discusses cognition training on the concentration of *open-skill* athletes, therefore researchers want to examine more deeply the effect of cognition training, in this case focused on *life kinetics* and *brain gym* training on the concentration of *open-skill* athletes.

METHODS

The method used in this research is the experimental method, in the experimental process, researchers apply *Life Kinetics* exercises and *Brain Gym* exercises as a form of exercise that is included in cognition training to improve the concentration of high-intellectual athletes in *open-skill* sports. This study is divided into two groups, namely experimental group one and experimental group two, experimental group one is given treatment in the form of *life kinetics* exercises, then experimental group two is given treatment in the form of *brain gym* exercises, *the* treatment will take place for 12 meetings with twice a week. Before being given treatment in the form of cognition exercises (*life kinetics* and

brain gym) to the two subject groups, the researcher will conduct an initial test using a research instrument in the form of an *Advanced Progressive Matrices* (APM) test to determine the intellectual level of athletes and the *Concentration Grid Test* (CGT) test to determine the level of concentration of athletes, while after the treatment has been given to the two subject groups, the final test is then carried out, with the aim of seeing the results of the treatment given to each subject group.

The exercise program in the *Life Kinetics* exercise model refers to (Komarudin, 2018) and carried out systematically with an intensity of 40 to 60% or done with fun activities. The *Brain Gym* exercise model refers to (Kulkarni & Ramesh Khandale, 2019) and carried out in reference to a previously compiled exercise program. Researchers chose this method because researchers wanted to test a cognition training treatment in this case was *kinetic life* training and *brain gym* training to improve athlete concentration in *open skill* sports. The research design used was a *two-group pretest-posttest control group design* (Fraenkel et al., 2012). Researchers chose this design because they wanted to test two training models, namely the *Life Kinetics* training model and the *Brain Gym* training model.

The population used in this study were 48 athletes from various *open skill* sports, including Fencing one athlete, Rafting one athlete, Badminton five athletes, Billiard one athlete, Basketball five athletes, Volleyball five athletes, Cricket two athletes, Futsal two athletes, Karate two athletes, Pencak Silat four athletes, Football nine athletes, Softball one athlete, Taekwondo eight athletes. The sampling technique in this study uses *purposive sampling* technique which means that the researcher takes a portion of the sample based on the criteria, the criteria in the research conducted are having a high intellectual level that will be tested using *Advanced Progressive Matrices* (APM), the biological age of the sample is 18 - 22 years, with an average training age of 4 - 6 years. Because researchers want to see if athletes who have a high intellectual level in *open-skill* sports, out of 48 athletes only 21 athletes who fit the criteria needed by researchers who will then be divided into two groups and given cognition training methods (*Life Kinetics* and *Brain Gym*).

SPSS is a software program that aims to analyze data and perform statistical calculations both parametric and non-parametric. SPSS has a fairly high statistical analysis capability, because in addition to providing convenience in calculations it is also able to analyze research with more variables. (Fauziah & Karhab, 2019).

RESULTS AND DISCUSSION

Results

Initial test data is given in order to determine the intellectual level of athletes used as research subjects and the level of athlete concentration. Meanwhile, the administration of the final test is intended to measure the athlete's ability after obtaining cognition training (*Brain Gym* and *Life Kinetics*). The author presents the research findings in the form of data processing and analysis results in the form of

tables and figures. The *Advanced Progressive Matrices* (APM) test results can be seen in table 1.

Table 1. *Advanced Progressive Matrices* (APM) Test Results

Category	Sample Quantity	Categorization
Average	11	Low Intellectual
Above Average	16	Low Intellectual
Smart	14	High Intellectual
Very Smart	7	High Intellectual
Total Sample	48	

Based on table 3 of the data collected through the *Advanced Progressive Matrices (*APM) test, there are 27 athletes who fall into the low intellectual category and 21 athletes who are included in high intellect. Henceforth, researchers only took 21 athletes who were included in the high intellectual group consisting of Fencing one person, Basketball three people, Volleyball one person, Cricket two people, Pencak Silat three people, Football five people, Taekwondo four people because researchers only focus on athletes who have high intellect, of these 21 athletes were divided into two groups to be given cognition training treatment (*Brain Gym* and *Life Kinetics*). The results of concentration test data taken before and after treatment using the *Concentration Grid Test* (CGT) on the two groups that have been divided before can be seen in table 2.

Table 2 Statistical Description of High Intellectual Athlete Group

Group	Test	Min.	Max.	Mean	Std. Deviation
Kinetic Life	Initial	5	10	7,91	1,700
(n = 11)	End	11	20	14,73	2,867
Brain Gym	Initial	5	12	8,30	2,263
(n = 10)	End	11	19	14,80	2,974

Based on table 2 above from the data obtained in conducting the initial and final tests, in the *Kinetic Life* group in the initial test there was a minimum value of 5, a maximum value of 10, the average initial test value of 11 athletes in the *kinetic life* group was 7.91, and a standard deviation of 1.700, in the final test of the *Kinetic Life* group there was a minimum value of 11, a maximum value of 20, the average final test value of 11 athletes in the *kinetic life* group was 14.73, and a standard deviation of 2.867. While in the *brain gym* group in the initial test there was a minimum value of 5, a maximum value of 12, the average initial test of 10 athletes in the *brain gym* group was 8.30, and a standard deviation of 2.263, in the final test of the *brain gym* group there was a minimum value of 11, a maximum value of 19, the average initial test of 10 athletes in the *brain gym* group was 14.80, and a standard deviation of 2.974. From the data above, it can be seen that there is an increase in concentration when *open-skill* athletes are given the *Life Kinetics* and *Brain Gym* training models. For further research, researchers conducted a data normality test to determine whether the data was at the normal distribution level or not using the Shapiro-Wilk test.

Table 3 Normality Test of High Intellectual Athlete Group

Group	Test	Statistic	df	Sig.
Kinetic Life	Initial	0,163	10	0,200
(n = 11)	End	0,236	10	0,086
Brain Gym	Initial	0,221	9	0,180
(n = 10)	End	0,159	9	0,200

Based on Table 3, it shows that the initial and final test scores of both groups of data changes are declared normal, because the significance value shows greater than 0.05 (5%).

Table 4 *Paired Sample t-test* Results in the *Kinetic Life* Group

Group	Variables		
	Concentration		
	t	df	Sig. (2-tailed)
Kinetic Life	16,137	10	0,000

Table 4 shows that the significance value is 0.000. In accordance with the basis for decision making above, if the Sig. value <0.05, then there is a significant difference in the initial test and the final test of the *Life Kinetic* group. Furthermore, the *Paired Sample t-test* will also be carried out on the *Brain Gym* group based on the data that has been collected, which can be seen in Table 5.

Table 5 *Paired Sample t-test* Results in the *Brain Gym* Group

Group	Variables		
	Concentration		
	t	df	Sig. (2-tailed)
Kinetic Life	21,151	9	0,000

Table 5 shows that the significance value is 0.000. In accordance with the basis for decision making above, if the Sig. value <0.05, then there is a significant difference in the initial test and the final test of the *Brain Gym* group.

Table 6 *Independent Sample t-test*

Levene's Test for Equality of Variances			***t-test for Equality of Means***		
Equal variances assumed	F	Sig.	t	df	Sig. (2-tailed)
	0,118	0,735	0,057	19	0,955

Based on Table 6 the Sig value. Levene's Test for Equality of Variances is 0.735 > 0.05, it can be interpreted that the data variance between the two groups given treatment in the form of *kinetic life* training and *brain gym* is homogeneous or the same. Based on table 6 Sig. (2-tailed) value of 0.955 >

0.05. Thus it can be interpreted that there is no difference in the average results of the research given to the two groups given treatment in the form of *life kinetics* and *brain gym exercises.*

Discussion

The Effect of Kinetic Life Training on the Concentration of Highly Intellectual Athletes in Open-Skill Sports

Life Kinetics is a modern technical action training program based on the formation of locomotive habits coupled with high activity of the nervous system, especially the athlete's intellect (Duda 2015). *Life Kinetics* is a concept with a combination of motor coordination and cognitive challenges where skills and perception of simple conditional effortless tasks such as eye-hand coordination or balance are combined with intellectual tasks to create complex exercises (Pietsch et al., 2017). (Pietsch et al., 2017).. As for previous studies conducted by Cakir et al. (2020) which explains that the *kinetic life* training model is able to improve ball control coordination skills in soccer. According to (Komarudin et al., 2021) *Life Kinetics* trains the brain with various cognitive challenges and challenging movement patterns that spur the brain to overcome challenges, whereas in conventional training, the training process tends to be monotonous and does not contain complex task challenges. It does not provide thorough stimulation to the brain even though the brain is an important part in achieving the best performance. *Life Kinetik Training* can stimulate two parts of the brain, namely the left brain and the right brain where athletes focus and form multitask abilities in difficult situations. The *life kinetic* training method keeps athletes interested and happy doing movement after movement without experiencing fatigue. *Life kinetics* training avoids monotonous, boring, and frustrating exercises in performing movement patterns. The thing that must be remembered by the trainers is that training with complex motion patterns involves the coordination system of nerves and muscles (*neuromuscular-system*), therefore athletes should not make movements until they are tired, if the athlete's condition is tired then the athlete will not be able to perform coordination movements, combinations, and accuracy of motion properly. (Mulyadi et al., 2021).

Based on the research and data processing carried out, there is a significant effect of giving *life kinetic* training treatment on the concentration of high intellectual athletes in *open-skill* sports. The increase in concentration of *open-skill* athletes after being given the treatment of *kinetic life* training can be seen in the *pre-test* and *post-test* results using the *Concentration Grid Test* (CGT). Research conducted by Mulyadi et al. (2021) said that the *life kinetic* training model can increase the concentration of soccer athletes statistical testing results, this is also evidenced by the significant increase in concentration that occurred from the pre-and post-test in the sample by 25%, the sample felt that the *life kinetic* training method was more able to stimulate the level of focus that athletes have in training. In its implementation, the application of the *kinetic life* training method combines three training components, namely movement activity training, cognition challenges, and visual perception training, especially peripheral visual perception (Demirakca et al., 2014). (Demirakca et al., 2016)..

During the research that took place, the researcher found interesting things in athletes when doing *kinetic life* exercises where the results between the *pre-test* and *post-test of* all athletes increased because when given the treatment the athletes were very enthusiastic, paid attention to the material well, if there was something that was not understood the athletes immediately asked and when the practice of the exercise was done well and always happy. The activeness of the athletes was seen when the researcher explained the parts of the kinetic life training movement. In the training process as well as its implementation, using an interesting and appropriate training program will help each athlete to receive the material provided by the coach .

The Effect of Brain Gym Training on the Concentration of High Intellectual Athletes in Open-Skill Sports.

Brain Gym is a structured non-aerobic physical exercise intervention in which a combination of specific patterns of crossed movements of the head, eyes, and extremities are performed in conjunction with brain and breathing exercises (Cancela et al., 2015). Meanwhile, according to (Pratiwi & Pratama, 2020) *Brain Gym* contains simple movements using the whole brain. *Brain Gym* can release hidden potential through body movements. Brain gym is a series of simple movements that are fun and can help develop the brain, both in coordination of the eyes, hands, ears and all the body. (Widanti et al., 2021). *Brain Gym* has benefits including stimulating brain function, increasing self-confidence, controlling stress and increasing concentration. This is because through *brain gym* movements the brain is stimulated and blood flow in the brain runs smoothly so that oxygen in the brain is fulfilled and can ultimately produce nerve growth factors (Khairiyah et al., 2021). (Khairiyah et al., 2023)..

During the research, the researchers found interesting things, where 10 athletes who were given treatment in the form of *brain gym* exercises affected the concentration of athletes as evidenced by the results of the *pretest* before being given *brain gym* training and *posttest* after being given *brain gym.* In the *Concentration Grid Test* (CGT) test used to measure the athlete's concentration level, the 10 athletes experienced a significant increase. Although the results of increasing the concentration of athletes given *brain gym* training are not as great as the application of *kinetic life training, the brain gym* training method is easy to understand and athletes are easy to practice even though there are some athletes who are slow to do *brain gym exercises.*

Differences in the Effect of Kinetic Life Exercises with Brain Gym Exercises on the Concentration of High Intellectual Athletes in Open-Skill Sports

Life kinetics and *brain gym* exercises are both cognitive training methods that have been proven to improve mental skills. Because the essence of *kinetic life* training is to combine several varied movements that can activate and connect cortical parts for the development of athlete efficiency during the training process. (Komarudin et al., 2021). Meanwhile, brain gym helps activate hearing so that we can hear more clearly, remember material before and during a test. (Kulkarni & Ramesh Khandale,

2019).. Brain gym can help activate the whole mind and body. Previous research by (Ansyah & Komarudin, 2023) said that motor skills can improve if a person does something to sharpen the brain so that it can trigger the release of endorphins. Endorphin hormones make individuals feel more relaxed, because individuals can focus more when the body is relaxed. (Zhang et al., 2017). The kinetic life training method and brain gym training are forms of cognitive training that combine several combinations of movements so that there is coordination between the body and the brain. Collaboration between technique and physicality will improve the quality of the soccer game itself. (Mulyadi et al., 2021). For open-skill sports where the environment is always changing and dynamic, it requires high concentration because athletes will always face situations that require complex technical skills in a short time. (Wang et al., 2013).

CONCLUSIONS

Based on the results of the research conducted, the researcher can provide several conclusions, namely there is a significant effect of *kinetic life* training on the concentration of high-intellectual athletes in *open-skill* sports. There is a significant effect of *brain gym* training on the concentration of high-intellectual athletes in *open-skill* sports. There is no significant difference in influence between *kinetic life* training and *brain gym* training on the concentration of high-intellectual athletes in *open-skill* sports.

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