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Original Research

Brain Gym PACE (Positive, Active, Clear, Energetic) as a Cognitive Intervention to Improve Concentration in Elementary School Children

Amelia Zaha Berliana[1], Lilis Maghfuroh[2*], Harnina Samantha Aisyah[3]

[1, 2,3] Nursing Departement, faculty of Healty Sciences, Universitas Muhammadiyah Lamongan, Indonesia

ABSTRACT

Background: *Concentration is an important aspect in a child's learning process. A child's ability to focus on a task or lesson material optimally will greatly influence the understanding and learning outcomes achieved. The purpose of this study was to analyze the effect of Brain Gym PACE on the concentration of children in grades V-VI.*

Methods: *The research design was used a pre-experimental method using one group pre-test and post-test design. The population of this study were students of grades V-VI of SD Muhammadiyah 1 Babat with inclusion and exclusion criteria. The sample was selected using stratified random sampling with a sample size of 76 children. The instruments used were the Army Alpha Intelligence Test questionnaire and SOP Brain Gym PACE. The intervention was given for 10 minutes a day, 3 times for 3 days. Data were analyzed using the Wilcoxon Sign Rank Test.*

Results: *Based on the results of the Wilcoxon statistics, a significance value of p = ≤0.001 (p < 0.05) was obtained, which means that there is an influence of Brain Gym on learning concentration.*

Conclusion: *These findings suggest that Brain Gym PACE has a positive effect on improving children's learning concentration. Educators are advised to implement Brain Gym PACE activities as part of their daily learning routine to support children's focus and optimize the learning process. Further research is recommended to explore the wider application of Brain Gym across educational contexts and age groups.*

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CONTACT
Lilis Maghfuroh
✉
lilisahza99@gmail.com
Nursing Department, faculty of Healthy Sciences Universitas Muhammadiyah Lamongan, Plalangan Plosowahyu Main Street KM 02 Lamongan.

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INTRODUCTION

Problems resulting from a lack of concentration in children on lessons will hinder the teaching and learning process. Concentration in learning is the focus of attention in the process of changing behavior which is expressed in the form of mastery, use, assessment of attitudes and values, basic knowledge and skills contained in various fields of study (Maharani et al., 2024). Lack of concentration in children is often

distracted by other things that are not related to learning, such as chatting with other students, daydreaming, or disturbing other students who are focused on the teacher. In grades V-VI, there are many outdoor activities such as non-academic extracurricular activities that must be followed, as well as many study agendas such as additional private tutoring, which can potentially reduce concentration when studying due to physical and brain fatigue (Heni & Nurlika, 2021).

International scale of IEA results (International Association for the Evaluation of Educational Achievement) gave the result that the concentration and reading skills of grade 5-6 elementary school students in Indonesia were at the lowest level. The average for elementary school students' reading test scores were Hong Kong at 74.55%, Singapore at 74.0%, Thailand at 61.1%, the Philippines at 52.6%, and Indonesia at 51.7%. According to UNICEF (United Nations Children's Fund) found 73% of elementary school children feel less concentrated (Anggraini et al., 2023).

Based on the Ministry of Education, Culture, Research, and Technology in 2021, regarding education in Indonesia, the category of repeating or being left in elementary school/equivalent shows that East Java has a percentage of 7.4% slightly below the percentage of Indonesia. This condition is attributed to decreased concentration in learning, which leads to a decline in children's academic achievement (Kemendikbudristek, 2021). Indonesian children are only able to master 30% of the reading material and find it difficult to answer descriptive questions that require reasoning. Based on a preliminary study conducted at SD Muhammadiyah 1 Babat on June 8, 2024, data was obtained from 10 children in each grade V-VI who experienced a lack of concentration during the learning process in class.

The homeroom teacher said that the class lasted for 7-8 hours, starting from 07.30 am to 14.00 pm, with 2 breaks. During the class, the homeroom teacher said that there were still many of his students who lacked concentration, indicated by chatting with their deskmates and not being able to answer when asked, and there were still many children who were sleepy in class. The homeroom teacher also said that he had never done Brain Gym at Muhammadiyah Elementary School 1 Babat.

Factors that influence decreased concentration in learning in children include low learning motivation, the child's level of intelligence, poor physical health, an unconducive learning environment, the child's passive attitude in the learning process, and lack of skills in using effective learning methods (Isnawati, 2020). The negative impacts that can arise due to lack of concentration in learning will cause children's learning activities to be less smooth. The achievements obtained will not be optimal, and lack of understanding of the lesson can cause children to have difficulty when doing tests or exams at school(Maharani et al., 2024).

There are several ways that can be done to overcome learning concentration disorders in children, namely by using various methods, namely music therapy, Al-Quran reading therapy, humor therapy, and puzzle playing therapy, as well as using Brain Gym as one of the methods used to improve children's concentration in learning (Hastutiningtyas et al., 2025). Brain Gym is a series of simple movements that function to stimulate the development of all parts of the brain synergistically so that children's logic and creativity are balanced (Suwardianto et al., 2022). One of the movements in Brain Gym is PACE, which consists of four main steps, namely Positive, Active, Clear, and Energetic.

The steps of the Brain Gym PACE begin with the Energetic stage, which involves drinking plain water to maintain brain hydration so that cognitive function remains

optimal. The next stage is Clear, performed with light massages at specific points on the head (brain switch massage) to enhance focus and readiness to learn. Following this, the Active stage is conducted through cross crawl movements that stimulate coordination between the left and right brains. The final stage is Positive, executed with the hook up or cross hook movement to create calmness and maximize concentration during learning. (Maharani et al., 2024).

Based on these problems, this study aims to examine the effect of Brain Gym PACE on the learning concentration of grade V and VI students at SD Muhammadiyah 1 Babat. Through this study, it is expected to obtain a deeper understanding of the effectiveness of Brain Gym PACE in increasing the level of learning concentration in students. The novelty of this research lies in the focus on the application of Brain Gym PACE among elementary school students in the Babat region, which geographically has not undergone neuro-educational based interventions. This study also aims to assess the effectiveness of the intervention on the age range of late elementary school, specifically in grades V and VI, which are at the stage of cognitive development in the formation of learning habits.

MATERIALS AND METHODS

This research is a quantitative research, using a pre-experimental research design using the one group pre-post test method without control. In this design, the assessment was carried out twice, namely before the experiment and after the experiment without a control group. The assessment carried out before the experiment is called a pre-test and the assessment after the experiment is called a post-test.

The population in this study were all children in grades V-VI at SD Muhammadiyah 1 Babat, totaling 93 children. The research sample was determined using a formula that produced 76 respondents, with a stratified random sampling technique. This technique was applied by dividing the population into two strata, namely class V with 37 students and class VI with 39 students, then samples were taken randomly from each of these strata.

The inclusion criteria in this study include: (1) Children in grades V-VI of Muhammadiyah 1 Babat Elementary School who are active; (2) Healthy and able to carry out activities without obstacles; (3) Present in class learning; and (4) Willing to be respondents as evidenced by completing an informed consent questionnaire. The exclusion criteria in this study included: (1) Children who were sick; (2) Inability to move the body; (3) Absence from class; and (4) Children who refused to be respondents. The inclusion and exclusion criteria were employed to minimize bias in this research.

The measurement tool used in this study is the standard procedure of Brain Gym PACE and the concentration instrument in this study used a questionnaire Army Alpha Intelligence test which is taken from Zulfa (2023), which has been tested for validity and reliability. Validity is done by comparing the r-product moment value with the r-table calculation result, which is 0.296. If the r-calculated value is greater than the r-table value and has a positive value, the question is declared valid. The results of the validity test are presented in the following table:

Table 1. Results of the Research Questionnaire Validity Test

Kode	R–Table	R–Count	Information
P1	0.2960	0.673	Valid

Kode	R–Table	R–Count	Information
P2	0.2960	0.660	Valid
P3	0.2960	0.534	Valid
P4	0.2960	0.696	Valid
P5	0.2960	0.484	Valid
P6	0.2960	0.478	Valid
P7	0.2960	0.492	Valid
P8	0.2960	0.486	Valid
P9	0.2960	0.617	Valid
P10	0.2960	0.472	Valid
P11	0.2960	0.534	Valid
P12	0.2960	0.492	Valid

Based on the results of the validity test, it was found that out of 12 questions tested, it was said to be valid (table 1). The reliability test of this study used the Alpha Cronbach method. The closer the reliability coefficient value is to 1.00, the higher the reliability. Based on the results of the reliability test, it was found that the questionnaire tested had an Alpha Cronbach value of 0.867, which means that the question items in the research questionnaire are reliable.

The data collection method in this study was carried out by providing a Brain Gym PACE intervention with a duration of 10 minutes, carried out 3 times in 1 day for 3 days. Then, a test was conducted on the child's learning concentration before and after Brain Gym PACE by using army alpha intelligence test. This study uses univariate and bivariate data analysis. Univariate analysis data in this study include: gender, class, number of siblings and child learning concentration. While bivariate analysis in this study includes research analysis with statistical tests. The results of the increase before and after the intervention was given to respondents were carried out by the Wilcoxon test.

This research has obtained ethical clearance from the Health Research Ethics Committee of Muhammadiyah Lamongan University. The ethical clearance was granted after a review process by the research ethics committee. The certificate of ethical clearance was issued under the number 022/EC/KEPK-S1/01/2025.

RESULTS

The research results are described in the form of an analysis of the characteristics and the effects of the Brain Gym PACE intervention on concentration in elementary school children. The findings of the study are as follows:

Table 2. Characteristics of Grade V and VI Elementary School Children (n = 76 Children)

Caracteristics of Children	n	%
Child Age		
10 years	26	34.2
11 years	42	55.3
12 years	8	10.5
Total	**76**	**100**
Gender		
Male	46	60.5
Female	30	39.5

Caracteristics of Children	n	%
Total	**76**	**100**
Class		
Grade V	37	48.7
Grade VI	39	51.3
Total	**76**	**100**
Number of Siblings		
1 siblings	14	18.4
2 siblings	31	40.8
3 siblings	23	30.3
More than 3 siblings	8	10.5
Total	**76**	**100**

Note: n = number of observation; % = percentage

Table 2 describes the characteristics of Grade V and VI elementary school children. Respondents (42 or 55.3%) were 11-year-old children, based on the examination of the respondents' age characteristics. There were a total of 46 male students (60.5%) from the analysis of characteristics based on the respondents' gender. There were 39 sixth-grade children from the analysis of characteristics based on the respondents' class. Analysis of respondents' characteristics based on the number of siblings, most of the fifth-sixth-grade children at SD Muhammadiyah 1 Babat had 2 siblings (31 or 40.8%) and a small number had more 3 siblings (8 or 10.5%).

Table 3. The Effect of Brain Gym PACE on The Concentration of Learning of Grade V and VI Elementary School Children (n = 76 Children)

Concentration Level	Concentration Level				p-value*
	Before		After		
	n	%	n	%	
Very Low Concentration	0	0	0	0	<0.001
Low Concentration	22	28.9	0	0	
Medium Concentration	42	55.3	24	31.6	
High Concentration	12	15.8	47	61.8	
Very High Concentration	0	0	5	6.6	
Total	**76**	**100**	**76**	**100**	

Note: n = number of observation; % = percentage; * Wilcoxon Signed Rank Test

Table 3 describes the effect of Brain Gym PACE on the learning concentration of Grade V and VI elementary school children. There is a statistically significant effect on increasing the respondents' concentration before and after receiving the intervention. Brain Gym PACE, significance value of concentration in learning p <0.001 was found to be smaller than the significance level that had been set at p of 0.05, so that the hypothesis (H1) in this study was accepted. The results of the statistical analysis showed that Brain Gym PACE has a significant influence on the learning concentration of grade V and VI children at SD Muhammadiyah 1 Babat.

DISCUSSION

Learning Concentration of Elementary School Children Before the Brain Gym PACE Intervention

A child is said to have a moderate level of learning concentration if he is still able to focus on the lesson, but tends to be easily distracted by external and internal stimuli. This level of concentration can be measured through the quality of attention, where the child can understand the process and complete the task, but sometimes requires repetition or additional direction. According to Faza and Mamnuah, (2024) moderate learning concentration is characterized by the breadth of attention focus between learning activities and other activities, which can ultimately interfere with the child's involvement in the learning process in the classroom.

Moderate learning concentration can be influenced by internal and external factors. This condition is in line with the theory put forward by Isnawati, (2020) stating that there are several factors that influence children's learning concentration, both internally, namely lack of motivation in children, the level of intelligence possessed by a child, the child's poor physical condition, while externally, namely an uncomfortable environment, being passive in learning, and not having the skills to learn. However, there are several theories that explain the decline in children's learning concentration is influenced by class level and number of siblings.

According to research by Heni and Nurlika, (2021) students in grades V and VI are often involved in various activities outside of school. The large number of study agendas and assignments that must be completed can reduce learning concentration, especially due to physical and mental fatigue. At this level, the difficulty of lessons also increases along with the increasing material that must be studied in preparation for junior high school education. In addition, students are faced with various exams that have the potential to disrupt their focus and concentration. A similar opinion was expressed by Nurmalasari and Susilowati, (2022) who stated that class level affects learning concentration; the higher the class level, the more complex the subject matter that must be understood, so that students face greater concentration challenges.

Based on this view, it can be assumed that class level has an important role in influencing students' learning concentration. Grades V and VI are the final levels in Elementary School before continuing to the next level of education, so that academic demands and the volume of assignments increase. This indirectly impacts students' ability to maintain learning focus. To overcome these challenges, effective learning strategies, good time management, emotional support, and a conducive learning environment are needed. Without such support, the risk of decreasing concentration in learning will be greater, which in the end can affect their readiness to face the next level of education.

According to Khairiyah et al, (2023) children who have 2 or more siblings in the family can affect the child's learning concentration through the dynamics and environment of the home. Where the lack of support from the family, including interaction with siblings, can affect children's learning achievement. When children who have many siblings may face more distractions at home, especially if there is no conducive studys PACE.

Based on this view, it can be assumed that a larger number of siblings has the potential to divide parental attention, which can have an impact on decreasing children's concentration and academic achievement. Limited attention and support from parents encourages children to rely more on interactions with siblings, which does not always

create an optimal learning environment. The results of this study are in line with research conducted by Devayanti et al., (2024) stating that Brain Gym is very effective in improving children's concentration in learning. by using pre-test and post-test concentration measuring instruments, the results obtained before the Brain Gym intervention were given, the pre-test values in the intervention and control groups, the dominant concentration was at a moderate level (Devayanti et al., 2024).

Based on the description above, it is known that before being given the Brain Gym PACE intervention, children tend to have a moderate level of learning concentration. If this lack of concentration is not addressed, it has the potential to reduce academic achievement. Therefore, Brain Gym PACE is seen as an effective method to improve learning concentration, so that it can support children's academic achievement optimally.

Learning Concentration of Elementary School Children After the Brain Gym PACE Intervention

A child is said to have high concentration when they are able to maintain focus for a long time, understand the material well, and are not easily distracted by external factors. According to Rachmad et al., (2022) high concentration when studying is characterized by the ability to maintain attention for a long time and efficient information processing. According to another opinion from Sa'idah et al., (2023) Children's high concentration when studying will correlate with better academic results and stronger problem-solving skills.

Increasing children's concentration in learning can be influenced by several factors, including age and gender. Based on gender, there are differences in characteristics that affect children's ability to focus attention while learning. Male students tend to focus more through physical and vsual-based methods, while female students maintain attention more effectively in a calm and structured environment. Therefore, Brain Gym PACE can be adapted to the specific needs of each gender. Male students more from dynamic movements such as Cross Crawl, while girls respond better to relaxation exercises that reduce stress and increase focus (Rizqullah et al., 2023).

Based on this view, it can be assumed that gender plays a role in influencing the level of learning concentration, depending on the student's ability to maintain focus and avoid distractions. The application of the right learning method, such as the Brain Gym PACE movement, is believed to be able to increase learning concentration in both male and female students, by adjusting the specific needs of each group. Based on Piaget's cognitive development theory, 11-year-old children are at the concrete operational stage (7–11 years). At this stage, children begin to be able to maintain attention longer than children at the preoperational stage (2–7 years) who are still easily distracted (Filsama, 2022).

Even though they can understand more complex concepts, they still need visual stimulation and activities to improve concentration. A child's level of concentration in paying attention to objects is also influenced by age. Preschoolers, for example, are already able to concentrate, but the duration of their focus is adjusted to the tasks and attention span they have at that age level (Maghfuroh & Salimo, 2020). According to Hermawati et al., (2023) stimulation is an important factor in supporting children's cognitive growth and development. One form of effective stimulation to improve learning concentration is the application of Brain Gym PACE.

According to the theory explained by Dennison 2009 Brain Gym PACE made to stimulate the lateral dimension, lighten the focusing dimension and relax the centering dimension (Isnawati, 2020). Brain Gym PACE has a positive effect on the parts of the brain used in the learning process and concentrate. The effect of the Brain Gym PACE movement itself can provide stimulation or stimulus to the brain by stimulating brain waves through light movements involving movements of the hands and feet, so that it can improve learning ability and concentration in children (Filsama, 2022).

Based on this view, it can be assumed a children grow older, they are better able to maintain concentration in learning due to better cognitive development and self-control. In children aged 7-11 years, the level of concentration is getting higher, but in terms of cognitive development, they still need visual stimulation and activities to improve concentration, one of which is by Brain Gym PACE. Brain Gym PACE able to stimulate children's brains with light movements, which can improve brain performance so that they are able to concentrate well while studying.

This research is in line with the research of Pertiwi and Syah, (2024) by providing interventions Brain Gym for 10-15 minutes 4 times a week for 2 weeks, using 12 movements Brain Gym namely the brain sacral, earth button, balance buttons, PACE button, cross movement, eight sleep movement, abdominal breathing movement, elephant movement, head rotation movement, owl movement, hand activation movement, horse stance movement and ear massage movement. The results of the movement were obtained Brain Gym has an effect on increasing children's concentration in learning. Meanwhile, research from Anggraini et al., (2023) by providing interventions brain gym PACE for 10-15 minutes 3 times a week, using movements Brain Gym PACE. The results showed that there was a difference in concentration when studying in children before and after being given movement Brain Gym PACE.

Based on the description above, it is known from the data obtained and in accordance with the existing theory, Brain Gym PACE and many other movements as one way to overcome the problem of lack of concentration in children when studying. It is proven that there is an increase in the results of children's learning concentration tests to be classified as high, and from observations made by researchers every day, children tend to be more active and not sleepy after being given Brain Gym PACE.

Effect of Brain Gym PACE on the Learning Concentration of Elementary School Children

Grade V-VI Elementary School children, that out of 76 children before being given intervention Brain Gym PACE The results obtained were that most of them had a moderate level of concentration. Meanwhile, after being given an intervention Brain Gym PACE The results obtained showed that most had high levels of concentration. This shows that there is a difference in the level of learning concentration before and after Brain Gym PACE intervention was given Brain Gym PACE.

The results of this study are supported by research conducted by Anggraini et al., (2023), which states that children who are given Brain Gym can improve their concentration while studying. This is because Brain Gym PACE movements can be done to refresh children's minds. Physically and mentally after undergoing the learning process that can cause brain tension which can directly reduce children's concentration in learning.

Brain Gym movements can stimulate the release of endorphins produced by the pituitary gland. Endorphins are known as “happy hormones” because they play an important role in improving mood. The release of endorphins occurs when the body needs pain relief, exercise, relaxation, or doing fun activities. This hormone provides a sense of comfort and helps the body become more relaxed after physical activity. When children do Brain Gym movements, they can feel calm and relieved in the body, which ultimately helps improve focus and concentration in learning (Rizqullah et al., 2023).

According to Maharani et al., (2024) Brain Gym exercises can activate the brain, enabling it to function more optimally. Brain Gym has been recognized as one of the most effective learning techniques by the National Learning Foundation USA. Through the PACE method, Brain Gym provides several benefits, including the ability to facilitate learning and working in a relaxed, stress-free state. Additionally, it can be performed in a short amount of time, does not require specific materials or locations, and is applicable in various learning, working, and daily life situations. According to another opinion by Sinaga et al., (2023) Brain Gym can also increase self-confidence, show results immediately, be effective in dealing with someone who experiences learning obstacles and stress, make someone independent in learning and activate all the potential, skills and concentration that a person has.

The results of this study are in line with research conducted by Khairiyah et al., (2023) which showed that before doing Brain Gym, children's learning concentration levels were in the moderate category. However, after participating in Brain Gym, the concentration level increased from the moderate category to the high category. These results indicate that Brain Gym has a positive effect on increasing learning concentration in children.

Another study conducted by Nurmalasari and Susilowati, (2022) using the Grid Concentration Test instrument also showed similar results. Before being given intervention in the form of Brain Gym, the majority of children were in the very low concentration category. However, after the intervention, the majority of children experienced an increase to the moderate concentration category. This finding strengthens the relationship between Brain Gym and increased learning concentration in children.

Based on the description above, it can be concluded that Brain Gym through the PACE method has a positive influence on the learning concentration of grade V-VI students at SD Muhammadiyah 1 Babat. The application of Brain Gym PACE not only improves students' learning concentration, but also provides benefits in various aspects of development, such as increasing enthusiasm, creativity, efficiency, and student learning achievement. It is hoped that further researchers can conduct research on Brain Gym using other movements besides Brain Gym PACE on children's learning concentration with the presence of a control or comparison group.

So that, it can be used as a reference for teachers to overcome the lack of concentration with other brain exercises. This research is expected to provide input to the Muhammadiyah 1 Babat Elementary School educational institution to use this method. Brain Gym PACE in overcoming the problem of lack of concentration in learning in children. This way can help teachers to help overcome the problem.

CONCLUCION

Based on the research objectives, the results of this study indicate that there is an effect on the concentration of learning of children in grades V-VI, with an increase after

being given the Brain Gym PACE intervention, most of the children's concentration levels were high. The application of Brain Gym has been proven to have a positive effect on increasing children's learning concentration. Through the PACE method, Brain Gym is able to optimize brain function, increase focus, and facilitate the learning process in a more relaxed and stress-free condition. This activity also helps students achieve a better level of concentration, so that it can support the learning process more effectively and optimally. Thus, Brain Gym can be used as an effective method in improving children's learning concentration in various learning situations.

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