

## Improving Short Term Memory Through the Brain Gym Method

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### Abstract

The elderly experience a deterioration in all physical functions, as well as an increased risk of illness and other health difficulties such as short-term memory loss. One of the sports aimed at preserving and increasing quality of life is brain gym, a collection of basic activities that tries to integrate the mind and body. This PkM practice was designed to socialize the brain gym and boost the elderly's short-term memory. The following were the approaches used to carry out this activity: First, a situation analysis on activity partners was done; second, a pretest was performed by evaluating short-term memory using the HVLTL instrument; third, the brain gym was implemented twice a week for three weeks; and fourth, at the end of the three weeks, the participants were evaluated. 25 senior adults participated in this exercise, and the results revealed a 56.50 percent rise in pre-test and post-test scores. Because the data was not normally distributed, the Wilcoxon test was used, and the results showed that the number 0.001 < 0.05. It may be established that Brain Gym has a significant effect on the short-term memory of the elderly. This improvement in short-term memory happened as a result of brain gym exercises that increased blood circulation to the brain and stimulated the hemispheres to engage, resulting in improved thinking capacity. This exercise concluded that practicing brain gym twice a week for three weeks can increase short-term memory, hence it is recommended that the elderly undertake brain gym to maintain and develop their short-term memory.

**Key words:** Brain gym; elderly; short term memory

### INTRODUCTION

All living organisms have a life cycle that begins with birth, progresses to maturity, reproduces, ages, and eventually dies. Meanwhile, for those who have been endowed with longevity, old age is a period that cannot be avoided (Uraningsari & Djalali, 2016).

The socioeconomic situation of the community is increasing in line with the increase in life expectancy (UHH), resulting in an increase in the number of the elderly. It is also expected that life expectancy in Indonesia would rise from 68.6 to 72.2 years from 2030 to 2035. This growth in the elderly requires the attention of the community and professional staff since the elderly are experiencing an increase in many types of health concerns, particularly degenerative illnesses. As a result, measures to promote the health of the elderly are required in order to mitigate the negative impact of increased life expectancy in Indonesia (Kemenkes RI), (Faridah, 2019).

Aging is the result of a series of gradual changes that cause susceptibility, increased illness, and mortality. It is related with free radicals as the primary cause of aging. Meanwhile, according to Kholifah (2016), an elderly person is someone who is 60 years or older. Aging is not a disease, but rather a process that results in accumulated changes over time. It is the process of lowering the body's resistance to both internal and external stimuli.

Aging is characterized by a progressive loss of physiological integrity, which leads to impaired function and increases the risk of mortality. This decline in function is a significant risk factor for human pathologies, including cancer, diabetes, cardiovascular disorders, and neurodegenerative diseases (Zalukhu et al., 2016). Physical issues, emotional troubles, and cognitive impairments are also common among the elderly. Cognitive (intellectual) issues include difficulties socializing and memory deterioration, particularly short-term memory, often known as senility.

Sport is a series of regular and planned exercises to maintain and improve movement abilities, as well as to maintain and improve one's quality of life. This is consistent with UU No. 3

Tahun (2005), which states that "sports are all systematic activities to encourage, foster, and develop physical, spiritual, and social potential." Brain gym, or brain exercise, is one of the gentle activities that the elderly may participate in.

Brain Gym is a set of basic activities designed to link or combine the mind and body. The brain gym is a component of the kinesiology educational process, in which precise movements are thought to be vital for enhancing or maintaining human cognitive function. Brain gymnastics improves the flow of blood and oxygen to the brain and stimulates both hemispheres of the brain to operate.

To improve brain integration of both left and right hemispheres by crossing physical movements, the movements of the extremities on one side of the body cross the midline and coordinate with the extremities on the other side so that both hemispheres are used at the same time. These physical movements can be in the form of brain exercises (Sularyo et al., 2002).

The Muhammadiyah Faku Raqabah Nursing Home is a social welfare organization that focuses on the elderly. This nursing home was established in the 1980s in order to boost the productivity of the aged in the local community and to pay more attention to the elderly. The elderly who live in orphanages must have a mentality that conforms to Islamic principles and be capable of taking care of themselves in order to become good Muslims and work. Currently, 25 elderly people reside at the Faku Raqabah Nursing Home, with eight living in the orphanage and 17 living with families in the surrounding area.

## **METHOD**

From August to October 2021, community service activities for the elderly were conducted out in the Muhammadiyah Faku Raqabah nursing facility in Bandung City. This PkM action was divided into three parts. The first stage was a scenario analysis, which involved completing an analysis of the challenges encountered by the elderly at the Muhammadiyah nursing home Faku Raqabah Bandung City, developing a problem-solving plan, and determining the money needed to carry out activities. A pre-test was administered before to the brain gym; the third step was the execution of PKM exercises; and the fourth stage is the post-test and activity evaluation. The Hopkins Verbal Learning Test (HVLT) was used as a pre-test and post-test to assess the elderly's short-term memory. Hogervorst examined the HVLT instrument and found it to have a sensitivity of 87% and a specificity of 98% with a cut-off point of 14.5. We compared the authenticity and dependability of Ismai. Internal consistency was demonstrated by R.I. et al., who had a Cronbach value of 0.968, indicating high trust (Ismail et al., 2013).

The HVLT assessment was carried out by reading 12 different types of words and objects and asking the elderly to repeat the words and objects. Words and nouns were spoken in two seconds, with a one-second break between words and nouns. Each accurate term or noun received one point, while the incorrect one received zero. This experiment was repeated three times, and the findings were totaled up and conclusions were drawn: a number less than or equal to 14 indicates dementia, whereas a value of 15-36 indicated normal (Kemenkes, 2016).

The elderly were trained in the brain gym twice a week for three weeks in the second stage. Brain Gym was a gentle action on the hands and head consisting of six fundamental movements accompanied by Sundanese music in this practice. The third step was an evaluation of PkM activities, followed by a post-test at the conclusion of the third week.

The following chart depicts the steps of the PkM implementation methodology:

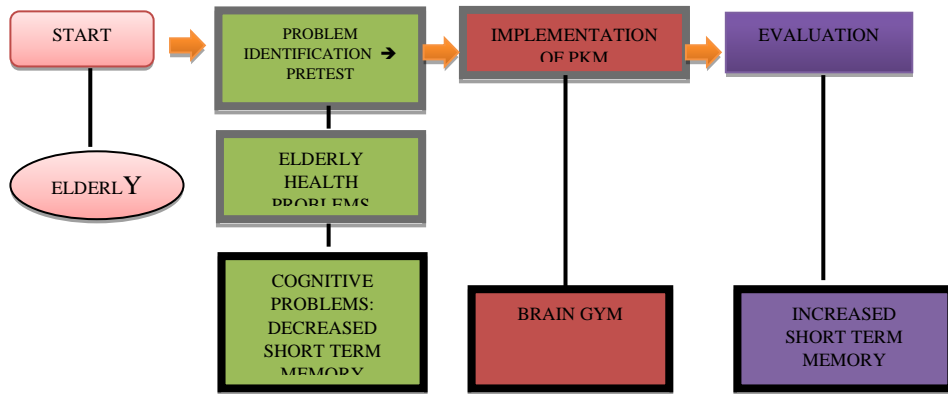


Figure 1. Method of PkM implementation

### RESULTS

From August to October 2021, 25 elderly people from the Muhammadiyah Faku Raqabah nursing home and the surrounding community participated in PkM activities at the Muhammadiyah Faku Raqabah nursing home in Bandung City at Gedebage Bandung City. Based on the results of interviews before the activity started, the elderly already knew about brain gym but did not know the movements and had never done brain gym exercises.

Regarding the results of PkM activities carried out by mentoring for the installation of brain gyms, which were conducted from August to October 2021, PkM activities were performed by accompanying the elderly to brain gyms twice weekly for three weeks.

At the beginning of the activity, instructions on how to do the brain gym and pre-test were given. After the PkM activities, a brain gym cadre was formed, and a post-test was carried out. The results of the pre-test and post-test are shown in the following table:

Table 1. Short Term Memory Pretest and Posttest Scores

Number of participants	Average Pascates Score	Average Posttest Score	Percentage Increase
25	16,92	26,48	56,50%

According to Table 1, the results of the HVLTL pre-test revealed a score of 16.92, whereas the results of the HVLTL post-test showed a mark of 26.48, representing a 56.50% rise.

The following table shows the results of the data normality test:

Table 2. Normality Test

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.196	25	.015	.887	25	.009
Posttest	.130	25	.200*	.901	25	.019

Table 2 shows that the pre-test and post-test results were not normally distributed, so the Wilcoxon test was carried out to test whether there was a difference between before and after doing Brain Gym on the short-term memory of the elderly.

The results of the different tests before and after the brain gym was carried out using the Wilcoxon Test can be seen in the table below:

Table 2 demonstrated that the pre-test and post-test results were not normally distributed, thus the Wilcoxon test was used to see if there was a difference in the elderly's short-term memory before and after Brain Gym.

The Wilcoxon Test results for the several tests before and after the brain gym are shown in the table below:

Table 3. Wilcoxon test

VAR00002 - VAR00001	
Z	-4.378 <sup>b</sup>
Asymp. Sig. (2-tailed)	.000

Based on the Wilcoxon test findings in table 3, it can be stated that Brain Gym has a considerable influence on the short-term memory of the elderly.

### DISCUSSION

Based on the description above, it can be said that a brain gym accompanied by Sundanese music twice a week for three weeks can increase the elderly's short-term memory. Other research have found that brain gymnastics improves cognitive performance in the elderly in RT 03 RW01 Kelurahan Tandes Surabaya (Yuliati dan Hidaayah, 2018). A study done by Wahyuni et al. (2017) found a considerable boost in short-term memory. Similarly, Mendrofa et al. (2020) discovered that Brian Gym might increase short-term memory. Brain gym is done on a regular basis according to FITT principles in order to improve short-term memory (Sajodin;Yualita Perla, 2022). The results are the same for PkM by Yualita et al, (2021) who used the PkM method to increase the ability and knowledge of PkM participants.

Memory is a storehouse of acquired knowledge that can be recalled at any time. Short-term memory is the memory that lasts from a few seconds to several hours. Short-term memory consists of two forms, namely habituation and sensitization. Habituation is a decrease in the responsiveness of an indifferent stimulus. Meanwhile, sensitization is an increase in response to mild stimulation. Habituated short-term memory is stored in the modified form of specific Ca<sup>++</sup> channels. Meanwhile, sensitization of short-term memory increases the entry of Ca<sup>++</sup> into the presynaptic terminal (Sherwood, 2016).

The cerebrum is divided into two clefts by the longitudinal cerebral fissure, into the left and right hemispheres (Wilson and Ross, 2014). Both hemispheres must simultaneously function. The existence of stimuli, for example, stress conditions, causes one part of the hemisphere to be switched off, which can cause various problems with impaired coordination and decreased ability to think (Zulaini, 2016). Brain Gym, which is light movements by practising coordination of the movements of the hands and head, can stimulate the brain to improve cognitive function, such as in senile dementia (Yuliati dan Hidaayah, 2018).

### CONCLUSIONS AND RECOMMENDATIONS

PkM activities such as mentoring in the implementation of the brain gym twice a week for three weeks are beneficial for maintaining or developing the elderly's short-term memory, thus it is recommended to carry out the brain gym to maintain and enhance the elderly's short-term memory. Based on the outcomes of this community service, Brian's Gym should be held on a regular basis, at least twice a week.

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## APPENDIX



Figure 1. Muhammadiyah Faku Raqabah Nursing Home.



Figure 2. Pre-test implementation; short term memory test



Figure 3. Implementation of the Brain gym



Figure 4. Brian gym and post-test implementation