
THE EFFECTIVENESS OF BRAIN GYM AND MEMORY GAMES NURSING THERAPY ON THE COGNITIVE ABILITIES OF THE ELDERLY AT THE ELDERLY POSYANDU, SIDOSERMO COMMUNITY HEALTH CENTER, SURABAYA

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ABSTRACT

Introduction

Execution of Brain Gymnastics, Memory Games and other cognitive activities to cognitive capacity of elderly people is still unclear in Posyandu Lansia Puskesmas Sidoserma Surabaya. The objective of this research was to explain the effectiveness of Brain Gym (Brain Gymnastics) and nursing therapy of Memory Games to cognitive capacity of the elderly in Posyandu Lansia Sidoserma Health Center Surabaya.

Method

Research Method was used Quasi Experimental Design. Population was Elderly in Posyandu Lansia Puskesmas Sidoserma Surabaya with Sampling Technique which was Simple Random Sampling and Research sample counted 33 respondents which consisted of 11 respondents with Gymnastic Brain (Brain Gym), 11 respondents with Memory Games and 11 respondents as a control group. Execution of treatment one week during once 2 months starting June - August 2010.

Result

The results of this research were Brain Gymnastics (Brain Gym) effective towards the cognitive capacity of elderly people in the Community Health Center of Sidoserma Surabaya with the Wilcoxon Signed Rank Test statistic $p=0.005$ ($p \leq 0.05$); Memory Games effective towards the cognitive elderly capacity in the Community Health Center of Sidoserma Surabaya with the statistical test Wilcoxon Signed Rank Test $p=0.003$ ($p \leq 0.05$) as well as the difference of the effectiveness of Brain Gymnastics (Brain Gym) and Memory Games towards the cognitive elderly capacity in the Community Health Center of Sidoserma Surabaya with the statistical test of Kruskal Wallis Test $p=0.006$ ($p \leq 0.05$).

Conclusion

It can be concluded that Memory Games was more effective than Brain Gym to increase the cognitive capacity of elderly at Posyandu elderly in the Community Health Center of Sidoserma Surabaya understanding life, being active in social life, and believing in God's intervention in life.

INTRODUCTION

Cognitive function is a person's ability to receive, process, store, and reuse all sensory input properly. Cognitive function in the elderly changes due to the aging process, including a decrease in the number of brain cells and a reduction in brain weight of 5-10%, and cognitive function deficits. Elderly people who experience cognitive dysfunction begin with a decrease in memory or recall or forgetfulness (Nugroho, 2008). Activities that are possible for the elderly to carry out and help stimulate memory skills, hand-eye coordination, and help them gain control over many specific brain functions include art projects, card games, gardening, Memory Games (cognitive therapy), karaoke, and brain training (Brain Gym) (Kuntjoro, ZS, 2002). However, activities for the elderly in the Posyandu Lansia at several Community Health Centers in Surabaya mostly only provide modality therapy for the elderly. The implementation of brain gymnastics and Memory Games has not yet been carried out, and the differences between the two therapies are unclear.

The elderly in 2000 were 7.28 % and are projected to increase to 11.34% in 2020. According to research in England, of 10,255 elderly people, 45% experienced cognitive dysfunction in the central nervous system (Nugroho, 2008). According to Medical Record data at one of the Community Health Centers in Surabaya (Sidosermo Community Health Center), there were 218 elderly with varying ages and on average (60%) experienced cognitive decline such as decreased orientation (forgetting what date it is), decreased ability to count or spell words

backwards, and decreased ability to recall or rename objects. The results of a preliminary study in March 2010, the efforts made by the Community Health Center in improving the cognitive abilities of the elderly were still not optimal. So far, the efforts made have only been in the form of physical services or care, including providing PMT (Supplemental Food), physical examinations and TTV (Vital Signs), 5% experienced an increase in blood pressure, blood sugar checks (5% experienced an increase in blood sugar), gout (10% experienced gout) and other disease indications as well as memory games nursing therapy only carried out during student practice such as games looking for picture pairs, guessing the name of objects or pictures. Cognitive decline in the elderly if left untreated and with increasing age, the subsequent impact that can occur will generally experience dementia which is a degenerative disease due to cell death which includes memory decline and delays in the thought process, loss of intellectual capacity, not only memory, but also cognitive, language and personality. (Gallo, JJ, et al., 1998). This dementia will then worsen gradually, called Alzheimer's dementia, around 10-15% occurs in those over 65 years of age and 20% in those over 80 years of age. Furthermore, elderly people with dementia will experience disruptions in daily family activities, especially when faced with new environments or situations, which can cause them to become nervous, anxious, and confused. Sometimes they forget or deny their spouse and children, and spatial disorientation can cause them to become lost in their surroundings. All of this can cause them to become a burden on their families (Lumbantobing, 2006).

Factors that increase the risk of cognitive impairment include a history of previous illness, a low level of education of less than 6 years, a slow response to treatment, and left hemisphere lesions and dysphasia (Setyopranoto et al., 2000). Research (Baltes, Smith et al., 1993) indicates that information processing speed declines in late adulthood. Other research suggests that older adults are less able to retrieve information stored in their memory. Information processing speed gradually declines in late adulthood. Brain exercises and memory games are movements that stimulate activity and harmonious coordination between the right and left hemispheres of the brain, facilitating the learning process and promoting a re-education of the entire mind and body system, thus closely linking intellectual and physical activity (Dennison, 2002). Research conducted at the Lamongan Werdha Social Services Unit (Tresna Werdha) indicates that brain exercises have an effect on improving cognitive function in the elderly (Jayanto, AD, 2009). In addition, research results in the United States show that memory games have an influence on cognitive abilities (Kluwer Academic, 2001).

Brain Gym is a series of exercises involving dynamic body movements that allow for a

MATERIALS AND METHODS

This study uses a " *Quasi-Experiment* " with a *cross-sectional approach*, to observe the condition of several variables at a certain time and at a certain moment (Sugiyono, 2007). The aim is to reveal a causal relationship between the independent variables of *Brain Gym*. (brain gymnastics) and *Memory Games* nursing therapy on the dependent variable of cognitive abilities in the elderly by

balance of activity between both hemispheres of the brain simultaneously. These movements stimulate the entire brain to function (Dennison, 2002). Brain Gym opens up previously blocked or inhibited areas of the brain, enabling learning or work activities to utilize the entire brain (Whole Brain Learning). Brain Gym is expected to yield results including improved language skills and memory, reduced emotional stress and clearer thinking, a more relaxed and enjoyable learning or work environment, leading to greater enthusiasm, creativity, and efficiency, improved health due to reduced stress, and improved academic and work performance (Al Arif, 2004). Brain Gym can be performed by people of all ages, as long as the participant can understand the instructions and follow the movements correctly (Lihardo, 2005). Memory games, on the other hand, are activities that focus on tasks or games that are cognitive (memory) in which the therapist guides participants through the prescribed steps. These activities can foster cohesion, sharing, communication, and cognition. Memory ability only occurs in human learning, which is a crucial process for humans by means of flowing information captured by the senses, forwarded, reduced, elaborated, rediscovered, and utilized (Ross, Mildred, 1991).

involving a control group in addition to the experimental group

The research sample uses the technique *simple random sampling* that has met the inclusion criteria, namely 33 elderly people at the Elderly Posyandu in the Sidosermo Surabaya Health Center working area. Data analysis: 1) *Wilcoxon Signed Rank Test*, *Mann Whitney Test*, *Kruskal Wallis Test* aims to compare the value of the output

variable before and after treatment and compare between the three sample groups.

RESULT

Table 1. Cognitive abilities of the elderly before and after treatment in the Brain Gym group and the control group at the Elderly Posyandu, Sidosermo Health Center , Surabaya in June-August 2010

No	Group Brain Gymnastics				Group Control		Group Brain Gymnastics		Group Control			
	Pre		Post		Pre	Post	Post		Post			
1	20	Not enough	20	Not enough	19	Not enough	21	Not enough	20	Not enough	21	Not enough
2	22	Enough	27	Good	18	Not enough	19	Not enough	27	Good	19	Not enough
3	18	Not enough	22	Enough	17	Not enough	19	Not enough	22	Enough	19	Not enough
4	22	Enough	26	Enough	21	Not enough	21	Not enough	26	Enough	21	Not enough
5	20	Not enough	28	Good	16	Not enough	16	Not enough	28	Good	16	Not enough
6	21	Not enough	26	Enough	21	Not enough	21	Not enough	26	Enough	21	Not enough
7	20	Not enough	27	Good	21	Not enough	21	Not enough	27	Good	21	Not enough
8	16	Not enough	22	Enough	24	Enough	25	Enough	22	Enough	25	Enough
9	23	Enough	27	Good	25	Enough	25	Enough	27	Good	25	Enough
10	19	Not enough	21	Not enough	20	Not enough	21	Not enough	21	Not enough	21	Not enough

11	22	Eno ugh	29	Good	23	En ou gh	22	Enoug h	29	Go od	22	Enoug h
X	20	Not .3 enoug h	25	Enoug .0 h	20	Not .5 enoug h	21	Not enoug h	25	En oug h	21	Not enoug h
Elem enta ry Scho ol	2. 05	3. 13	2. 84	2.5 3.1	2. 5							
p = 0.005 (<i>Wilcoxon Signed Ranks Test</i>)				p = 0.84 (<i>Wilcoxon Signed Ranks Test</i>)				p = 0.005 (<i>Mann Whitney Test</i>)				

Table 1. shows the statistical results by presenting a comparison of pre-observation and post-observation scores in the Brain Gym treatment group, the pre-observation mean was 20.27 and SD 2.05; the post-observation mean was 25.00 and SD 3.13 with the *Wilcoxon Signed Ranks Test* , the significance value $p = 0.005$ ($p \leq 0.05$) means H_0 is rejected, there is an effect of brain gymnastics on the cognitive abilities of the elderly. While in the control group the pre-observation score, the pre-observation mean was 20.45 and SD 2.82; the post-observation mean was 21.00 and SD 2.56 with the *Wilcoxon Signed Ranks Test* , the significance value $p = 0.84$ ($p \leq 0.05$) means H_0 is accepted, there is no effect on the control group that was not given treatment.

After comparing the post-observation results in the Brain Gym treatment group with the post-observation of the control group using the *Mann Whitney Test*, the test results showed a significant $p = 0.005$ ($p \leq 0.05$), meaning H_0 was rejected, there was a difference in the results of cognitive abilities of those who received Brain Gymnastics and those who did not receive Brain Gymnastics.

Table 2. Cognitive abilities of the elderly before and after treatment in the *Memory Games* group and the control group at the Elderly Posyandu, Sidosermo Health Center, Surabaya in June-August 2010

No	Group Memory Games		Group Control		Group Memory Games		Group Control					
	Pre	Post	Pre	Post	Post	Post	Post	Post				
1	2 0	Not enoug h	2 2	Enoug h	19 19	Not enoug h	2 1	Not enoug h	22 22	Eno ugh	2 1	Not enoug h
2	1 5	Not enoug h	2 3	Enoug h	18 18	Not enoug h	1 9	Not enoug h	23 23	Eno ugh	1 9	Not enoug h
3	2 2	Enoug h	2 7	Good	17 17	Not enoug h	1 9	Not enoug h	27 27	Goo d	1 9	Not enoug h
4	2 2	Enoug h	2 6	Enoug h	21 21	Not enoug h	2 1	Not enoug h	26 26	Eno ugh	2 1	Not enoug h

5	2 Not enough	2 Enough	16	Not enough	1 Not enough	25	Enough	1	Not enough
1	h	h		h	h		h	6	
6	2 Enough	2 Enough	21	Not enough	2 Not enough	26	Enough	2	Not enough
3	h	h		h	h		h	1	
7	2 Not enough	2 Enough	21	Not enough	2 Not enough	24	Enough	2	Not enough
0	h	h		h	h		h	1	
8	1 Not enough	2 Enough	24	Enough	2 Enough	23	Enough	2	Enough
9	h	h		h	h		h	5	
9	2 Enough	2 Good	25	Enough	2 Enough	27	Good	2	Enough
2	h	7		h	h		d	5	
1	1 Not enough	1 Not enough	20	Not enough	2 Not enough	18	Not enough	2	Not enough
0	h	h		h	h		h	1	
1	2 Enough	2 Good	23	Enough	2 Enough	27	Good	2	Enough
1	h	7		h	h		d	2	
X	2 Not enough	2 Enough	20.5	Not enough	2 Enough	24.3	Enough	2	Enough
.	h	h		h	h		h	1	
5		4						0	
E	2	2	2.84	2	2.76	2			
l				
e	6	7		5				5	
m	5	6						6	
e									
n									
t									
a									
r									
y									
S									
c									
h									
o									
o									
l									
	p = 0.003			p = 0.084				p = 0.03	
	(Wilcoxon Signed Rank Test)			(Wilcoxon Signed Rank Test)				(Mann Whitney Test)	

Table 2 shows the statistical results by presenting a comparison of pre-observation and post-observation scores in the *Memory Games treatment group* , the pre-observation mean was 20.45 and SD 2.65; the post-observation mean was 24.36 and SD 2.76 with the *Wilcoxon Signed Ranks Test* , the significance value $p = 0.003$ ($p \leq 0.05$) means H_0 is rejected, there is an influence of *Memory Games* on the cognitive abilities of the elderly. While in the control group the pre-observation score, the pre-observation mean was 20.45 and SD 2.82; the post-observation mean was 21.00 and SD 2.56 with the *Wilcoxon Signed*

Ranks Test , the significance value $p = 0.84$ ($p \leq 0.05$) means H_0 is accepted, there is no influence on the control group that was not given treatment.

After comparing the post-observation results in the Brain Gym treatment group with the post-observation results in the control group using the *Mann Whitney Test* , the test results showed a significant $p = 0.03$ ($p \geq 0.05$), meaning H_0 was rejected, there was a difference in the cognitive ability results of those who received *Memory Games* and those who did not receive *Memory Games* .

Kruskal Wallis Test statistical test obtained $p = 0.006$ ($p \leq 0.05$) meaning H_0 was rejected, there were differences in the cognitive abilities of the elderly in the three

DISCUSSION

The effectiveness of Brain Gym on the cognitive abilities of the elderly

The distribution of cognitive abilities in the Brain Gym group before treatment had an average of 20.27 indicating that the cognitive abilities of the elderly were lacking and SD 2.05. The cognitive abilities of the elderly that were lacking included current orientation in time, place, and person orientation, registration and recall as well as in language items, especially following commands and writing sentences. While the results of post-observation, the respondents' cognitive abilities increased, namely an average of 25.00 indicating sufficient cognitive abilities and SD 3.13. The cognitive abilities of the elderly were sufficient, indicated by an increase in orientation in time, place, and person, registration and recall increased, but in writing sentences they were still lacking. The increase in the results of the cognitive abilities of the elderly pre and post Brain Gym treatment was strengthened by the results of the Wilcoxon Signed Rank Test with a significance of $p = 0.009$ ($p < 0.05$), (H_0 was rejected) which means there was an effect of Brain Gym on the cognitive abilities of the elderly. Based on previous research conducted by Jayanto AD (2009) that there was an effect of the implementation of Brain Gym therapy on improving the cognitive function of the elderly. Furthermore, scientists have concluded that society must prioritize improving the

groups, in the brain gymnastics treatment group, the *Memory Games treatment group* and the group that was not given treatment between the two.

quality of life for those experiencing cognitive decline. In the elderly, cognitive function declines include memory, attention, language, and problem-solving skills, which can lead to problems with long-term memory, information processing, intellectual performance, and task performance (Pujiastuti, SS, 2003).

After being given Brain Gym, there was a significant increase in the cognitive abilities of the elderly. This is supported by the average educational level of junior high school respondents, as many as 6 elderly people out of 11 respondents (55%). The data shows that the elderly have received formal education so that it can support the knowledge and attitudes possessed by the elderly. Education can be seen in two sides, namely: (1) education as an observable practice and (2) education as a theory as knowledge (Sudrajat, A, 2009). A higher level of education accompanied by being in a higher social strata is assumed to be able to reduce cognitive decline (Ahmad, I, 2006). In a formal education, it will be able to provide learning experiences that can stimulate a person's cognitive function. Experience will provide stimulation to sensory and psychomotor functions that can become intellectual information that is ready to be recalled in cognitive function (Piaget, 1977).

Age limits also affect the cognitive abilities of the elderly. In this study, 6 out of 11 elderly people (55%) were aged 56-60 years and 5 out of 11 elderly people (45%) were aged 61-65 years. According to

Wahyudi, I (2008), this age group includes middle age and early elderly. Elderly or elderly is an age group in humans who have entered the final stage of their life phase. WHO groups the elderly into 4 groups which include: 1) Middle age (middle age) which is the age group of 45-59 years, 2) Elderly which is between 60-74 years, 3) Old which is between 75-90 years, 4) Very old which is more than 90 years

When the results of cognitive abilities after Brain Gymnastics were compared with the control group, there was a significant difference. This was shown by a comparison of the post-intervention results in the treatment group and the control group using the Mann Whitney Test, which obtained a significance value of $p = 0.003$ ($p < 0.05$), (Ho was rejected) which means there was a difference in the cognitive abilities of the elderly between those given Brain Gymnastics and those who were not.

The most common decline in the elderly is a decline in memory (Ministry of Health, 2008). This decline in cognitive ability is often considered a common problem and a natural occurrence in the elderly. However, cognitive decline, characterized by frequent forgetfulness, is one of the early symptoms of dementia in the elderly. The subsequent impact of cognitive decline generally leads to dementia. When viewed from above, the cerebrum appears to be divided into the left and right hemispheres, separated by a deep, longitudinal groove called the Longitudinal Fissure. At the base of the groove is a collection of fibers connecting the two hemispheres, called the Corpus Callosum. The cerebral hemispheres are separated by a structure located between the two hemispheres, called the Corpus Callosum, nicknamed the "Golden Bridge." This can

be achieved through brain exercises such as Crossing the Midline. Brain exercises based on body, head, and eye movements that cross the midline can increase brain potential. In the elderly, brain weight decreases by up to 10% between the ages of 30 and 70. The reduction in brain volume with aging affects the shrinkage of brain cells' neurons. This neuronal shrinkage will affect the performance of the cerebral cortex because the cerebral cortex is the brain region most affected by neuron loss. Most of the storage of thought processes and information occurs in the cerebral cortex. Information storage is a process called memory. A decline in the ability of the cerebral cortex will result in disruption of the neurotransmitter transmission system. Elderly people who experience disruption of the neurotransmitter transmission system, the brain's central nerve cells, can later develop mental and behavioral disorders, one of the consequences of which is a decline in cognitive function (Sidiarto, 2004).

Decreased cognitive function in the elderly can be given brain exercise therapy .

In the application of the brain gym method, there is a dimension of concentration for the limbic system (midbrain) and the cerebrum (cerebral cortex) (Dennison, 2009). In the cerebral cortex there are Functional Areas that divide the functions of each hemisphere of the right and left. Brain Gym optimizes the right brain hemisphere which is generally responsible for controlling the left side of the body, and functions for intuition, feeling, music, dancing, creativity, and seeing the whole. The right brain also encourages humans to socialize, communicate, interact with other people,

and control emotions. In the right brain also lies the ability to intuitively, the ability to feel, integrate, and express body. The left brain hemisphere is generally responsible for regulating the right side of the body which functions for logical, rational, analytical thinking, writing and reading skills, speaking, time orientation, and detailed matters. The left brain is also the center of mathematics (Kartini S, 2003). The intersection of these various sensory interpretation areas develops primarily on the dominant side of the brain, the left side in almost everyone, and this area plays a significant role in higher brain functions within each part of the cerebral cortex, a function we call "thinking." The functional area of the cerebral cortex, Wernicke's Area, is responsible for thought processes, language comprehension, and memory patterns. If Wernicke's Area in a well-developed individual's dominant hemisphere is damaged, the individual will normally lose almost all thinking functions and associated memory patterns related to language (Guyton & Hall, 1997). Brain gymnastics itself aims to maintain optimal balance between the right and left brain. Brain gymnastics stimulates repair of fibers in the corpus callosum, which provides numerous two-way neural connections between the cortical areas of both hemispheres. This includes several brain structures, including the hippocampus and amygdala. Brain gymnastics movements reactivate neural connections between the body and the brain, facilitating the flow of electromagnetic energy throughout the body. These movements support the electrical and chemical changes that occur in all mental and physical events (Dennison, 2009). The role of the hippocampus in consolidation appears to be a cross-reference system, linking specific

aspects of memory stored in separate parts of the brain. This can then lead to increased nucleic acid content in neuronal memory changes. Synapses influence the processing of received information or data. This allows humans to store information in their memory. Information storage is a process we call memory and is also a function of synapses. Synapses are the connection points between one neuron and the next. Synapses are a favorable place for regulating command transmission. Synapses also function to transmit information from one neuron to another easily. Improved synapse function can affect the performance of the cerebral cortex, which is involved in processing new information as a pathway to the cortex for permanent memory storage. The cerebral cortex is the outer layer of the brain involved in higher-level cognitive processes. This can then be followed by improvements in other cognitive functions such as orientation, registration, attention and calculation, recall, and language.

Cognitive function is a person's ability to receive, process, store and reuse all sensory input properly. Cognitive function consists of elements, paying attention (attention), remembering (memory), understanding speech/communication (language), moving (motor) and planning/executing decisions (executive) (Gallo, 1998). Cognitive impairment is a disorder of the brain's higher functions in the form of impaired orientation, attention, concentration, memory and language as well as intellectual function (Setyopranoto, et al., 2000). The positive impact of brain gymnastics on the elderly, after 2 months of brain gymnastics there is an increase in memory function (cognitive), concentration

(intelligence), attention and alertness to reduce dementia (Josua Lihardo, 2005).

Brain Gym can improve brain performance. Generally, as people enter old age, they experience a decline in cognitive function. This cognitive decline can be improved by brain gym. This exercise is usually recommended four times a week, for about 15-20 minutes each time. Brain Gym optimizes the right and left hemispheres of the brain. Brain gym movements can help balance both hemispheres, sharpen concentration, relieve muscle tension (relaxation), and sharpen memory. The effects of brain gym not only improve blood and oxygen flow to the brain but also

The effectiveness of memory games on the cognitive abilities of the elderly

The cognitive ability of the elderly before being given Memory Games was an average of 20.45 (less category) with SD 2.65, namely there was a decrease in the orientation of time, place and person, registration, attention and recall, and language. However, after being given Memory Games, the average cognitive ability was 24.36 (sufficient category) and SD 2.76, there was an increase in registration, attention and recall, but there was no improvement in language ability. This indicates an increase in cognitive ability in the elderly after being given Memory Games treatment. The results of statistical tests with the Wilcoxon Sign Rank Test in the Memory Games treatment group, the significance value $p = 0.003$ ($p < 0.05$) means H_0 is rejected, there is an effect of Memory Games on the cognitive ability of the elderly. After being compared with the control group with the Mann Whitney Test, the significance value $p =$

stimulate both hemispheres to function (Kartini, S, 2003). After brain gym was performed, cognitive function in the treatment group increased. This means there was an improvement in cognitive function in the elderly after the brain gym intervention. Cognitive decline in the elderly is caused by the shrinkage of synapses connecting neurons. As a result, these nerves cannot regenerate and renew the connections within the cerebral cortex. Of the several alternative methods for improving cognitive function, brain gymnastics is one effective action to improve the quality of cognitive function in the elderly.

0.03 ($p < 0.05$) means H_0 is rejected, there is a difference between the cognitive ability of the elderly in the Memory Games group and those without.

Memory games nursing therapy is an activity that focuses on tasks or games that lead to cognitive (memory) development, where the therapist guides the therapy member to carry out the specified steps (Ross, Mildred, 1991). Memory ability only occurs in human learning, which is a crucial process for humans by flowing information captured by the senses, forwarding, reducing, elaborating, rediscovering, and utilizing it (Neisser, 2005).

Cognition and communication can take place in the game process at each stage or stage of the game, making the relationship between participants in one scene and another closer and in addition, the relationship between participants and the environment can be established, which creates sensory stimulation for participants (Ross, Mildred, 1991).

Memory Games allow individuals, especially the elderly, to engage in group activities, stimulating sensory skills that support cognitive action. Furthermore, these activities motivate the elderly to communicate, socialize, and be more creative, which will support their future life processes. This is supported by the elderly's work history and leisure activities. In this study, the average work history of the elderly was as civil servants (5 out of 11 respondents (46%)), and an average of 4 out of 11 respondents (36%) had activities at home. According to Lesmana (2006), previous work experience has an impact on the quality of the elderly's thinking process.

By interacting with older adults in an activity, cognitive abilities will develop due to environmental influences. The surrounding environment can facilitate orientation and attention skills to stimulate a person's cognitive abilities. In addition, social influences or social transmission can support the process of cognitive abilities to be maximized. Social influences will provide an opportunity for a person to learn to understand speech, communicate, plan and make decisions, and be able to adapt to the environment. All of these are external factors that can support cognitive abilities (Piaget, 1977).

The Effectiveness of Brain Gym and Memory Games on the Cognitive Abilities of the Elderly

Synapses in the nervous system are the connection points between one neuron and the next and are essential for regulating signal transmission. Only a small portion of sensory information is essential for immediate motor reactions; the remainder is largely stored to regulate future motor activity and thought processes in the

cerebral cortex, basal ganglia, and spinal cord. Information storage is a memory process and is a function of synapses (Guyton, 1990).

Each time a sensory signal passes through a series of synapses, it is transmitted to the next synapse. If this is done repeatedly, the synapses become facilitated so that signals from the brain's control center can also cause impulses to be transmitted through the same series of synapses even though the sensory input is not stimulated (stimulating memory capacity). Once memories have been stored in the nervous system, the brain's thought processes will compare sensory experiences with memories, thereby stimulating perception, memory, and problem solving, and making it easier to recall memories, knowledge, and experiences (Ganong, WF, 1995).

Meanwhile, according to Dennison, PE, Dennison, GE, (2009) stated that brain gym activities will stimulate brain functions consisting of three dimensions that are interconnected as a whole, namely: stimulating (Laterality Dimension), lightening (Focusing Dimension) and relaxing (Centering Dimension). Laterality is the ability to coordinate one part of the brain with another part, especially in terms of vision, hearing and movement in the middle part,

The area where both sides complement each other. This skill provides the foundation for reading, writing, and communication. It is also essential for smooth overall body movement and for the ability to move and think simultaneously. The Laterality Dimension will involve the ease of communication between the right and left sides of the brain and the connections across the right and left sides

of the body. Midline Crossing Movement will re-establish the joint pattern to facilitate movement of both sides of the body (right-left) across the body's midline,

CONCLUSION

Memory Games Nursing Therapy is more effective than Brain Gym in improving cognitive abilities in the elderly at the Elderly Posyandu, Sidosermo Health Center, Surabaya . Brain gymnastics and *Memory Games* can be given to the elderly and implemented correctly can be proposed

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including movement of both hands, turning the head to the right-left, glancing to the right-left of the visual field, and movement of both legs for walking.

as a standard operating procedure in the Elderly Posyandu in the Sidosermo Surabaya Health Center work area and can be implemented continuously as an elderly activity whose effectiveness can later be further observed to support the improvement of the elderly's cognitive abilities.

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