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A Comparative Study of Brain Gym and Dynamic Movement Skill on Working Memory in Middle Aged Women with Memory Oblivion

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Abstract

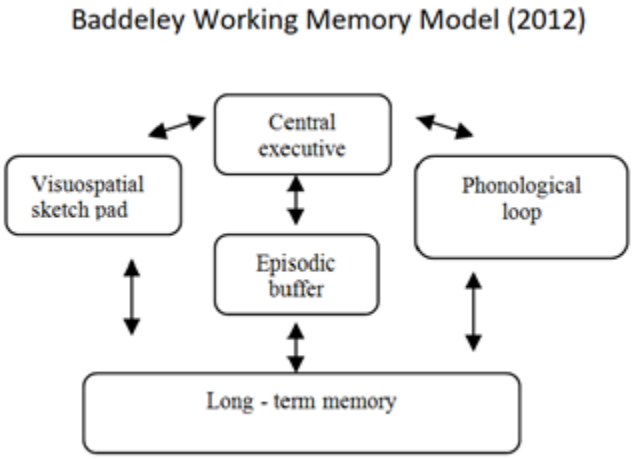
Cognitive devaluation is normal part of deteriorate Process. Many studies proclaim that novel skill physical training is most important for sustain brain Performance (Bhernetal 2013; King and kitchen 2014)[8]. Objective: This study is to compare Brain Gym and Dynamic Movement Skill on working memory in Middle - Aged Women with Memory Oblivion. Outcome tool: In Digit Memory test, Digit forward and Digit backward task scores are taken to evaluate working memory performance. Method: Participants randomly assigned into groups. Group A (n= 30) Brain Gym and Group B (n=30) Dynamic Movement Skill. Both groups acquired their consultation five days/week for 12 Weeks. Result: It Shows improvement in working memory performance for both intervention group. % Increase in Digit Forward and Digit Backward task post test scores is greater in Dynamic Movement Skill than Brain Gym. Conclusion: This Study concluded that Dynamic Movement Skill showed highest improvement than Brain Gym.

Keywords: Dynamic Movement Skill, Brain Gym, Working Memory

1. Introduction

Working Memory is ahead method of Cognitive mission this is figuring out the gaining knowledge of method. It dispenses meantime storage of info compulsory for extra multiplex gaining knowledge of pursuit (Baddeley et al., 2012). In 1974, Baddeley & Hitch proposed version of running memory that turns into an opportunity to diverse version of memory storage.

Figure 1



The above diagram is the principle element of Baddeley's operating memory version this is led via way of means of government functions, the maximum essential element which performs a position in synthesizing acquired statistics. Episodic buffer accountable for recalling statistics, integrating and manipulative substances relying at the government process. The visible-spatial sketch pad shops nonverbal visible and spatial statistics like items and numbers. The take a look at discovered that the bounds visible-spatial memory capacity (among four to 7 items) is relying on the extent of cognizance and the techniques used (Cowan, 2001; Zimmer et al., 2010). The phonological loop is part of that shops a restricted quantity of speech sounds for a briefperiod[1]. This higher-level skill is involved in intention to a task despite interruption. Target of working memory is to hand over additional information to our long-term memory [2].

Working memory is basic ponder to be the area of human cognition that cardinal the fast time period garage and contrive of data (Baddeley 1992, 2003a,2012; Cowan, 1998, 1999, 2010). The capability seems to play a salient function umpire among the processing of saved or incoming data and its use for precise cognitive goals, as various as orientation, reasoning, language processing, making plans and spatial processing (Cansino et al., 2013). Healthy getting old normally constitutes the baseline contrast for issues which might be related to getting old in addition to running reminiscence deficits which include Alzheimer's disease, Dementia and Mild Cognitive Impairment (Pfeiffr, Lokkegaard, Zoetmulder, Friberg, & werdelin, 2014; Whitwell et al., 2015). Many research scrutinizes getting old results on running reminiscence has as compared more youthful and older adults. They discovered that getting old detrimentally have an effect on diverse elements of running reminiscence, for each verbal and non-verbal data. Ageing captiously impacted running reminiscence execution. Cognitive bills have attributed the located age-associated running reminiscence adjustments to a fashionable slowing of cognitive processing to say no in attentional assets to decreased performance of inhibitory strategies or to slower retrieval speed. From the neural outlook, running memory adjustments were related to age-associated adjustments with inside the prefrontal cortex with inside the mind that's salient for runningmemory[3].

A growing number of studies have investigated the effectiveness of process-based working memory training and their possible positive impacts on other cognitive abilities such as reasoning4. Exercise is recognized as a promising approach to counteract aging – associated decline in cognitive function. An important healthcare need in our aging society is development of easily applicable, non-invasive strategies to aid the functional independence of elderly with cognitive complaints. Cognitive Ageing has been extensively studied mostly focusing on old age. However, factors affecting brain structure and function exert continuous and cumulative influences across the whole life span. In disorders such as Alzheimer's disease neuro degeneration is evident while individuals are still cognitively normal 10 to 20 years prior to dementia diagnosis. For this reason, research is now focusing more and more on middle-age with the hope of uncovering mechanism that allow initiating intervention as early as possible[12]. An Important healthcare need in our aging society is the development of easily applicable noninvasive strategies to aid the functional independence of elderly with cognitive complaints. Hence, strengthening of neural network integrity is considered a prime target for intervention strategies. Strengthening exercise, aerobic exercise may not be sufficient by themselves, since these methods do not necessarily target large network. Fitness training, High Intensity Interval Exercise, and strengthening workout are distinct to exaggerate mind work in vintage elderly adults[8,9,10,19]

Brain plasticity is a lifetime developmental process and continues to play a significant role in older adulthood. Cognitive and motor activities have to be intellectually stimulating and physically appropriate to bring about maximal benefits to the aging brain[6]. In Dynamic Movement Skill, the newly obtained experience will alter the neural maps, networks, pathways or circuits made up of countless neurons and synapses[6, 31]. Brain gym is a program of exercises that focus on the performing of specific physical activities that activate the brain, thereby enhancing cognitive performance and making it more receptive to learning[7].

2. Method

Study Setting: Community dwelling individuals, Tambaram, Chennai

Study Design: Experimental Study

Sample Size: 100 Group A = 50, Group B = 50

Exercise Session: 5 days/week for 12 Weeks

2.1 Inclusion Criteria

- Age: 40 – 50 years
- BMI: 18.5 – 24.9 kg/m2
- Gender: Female
- Memory Complaint Scale Score: Moderate Memory Complaint Score (7 – 10)[13]
- VO2 MAX: Range 31 – 41 ml/kg.min[14]

VO2 MAX calculated by using Personalized step test [15,16,17]

2.2 Exclusion Criteria

- History of DM, HT, Psychiatric or systemic disease, Substance abuse, Movement disorder.
- Restricted Mobility (Disabled Person, Major visible or listening to impairment)
- Diagnosis of Orthopedic, Neurological & Cardiovascular disease.
- History of any Surgery in final six months
- Bone density problem
- In Physical Activity readiness questionnaire in the event that they responded sure to one of the questions they may be excluded.[18]

2.3 Materials

- Dynamic Movement skill Mat
- HR Monitor
- Weighing Machine
- Height Adjustable wooden Stepper.

2.4 Intervention

A general of 107 individuals have been recruited for the study via Vels assignment hospital, VISTAS, Thalambur. Out of which 4 have been now no longer proven hobby to take part in the study; 3no longer met the inclusion criteria. Participants have been absolutely voluntary and all subjects gave the written knowledgeable consent form. 60 – 80% as target heart rate must maintain during workout[19,20]. Max HR is calculated through the usage of the method HR max = 208 – (0.7 x age)

2.5 Randomization

Study Participants were randomly assigned into two groups.

Group A (n=50) – Brain Gym

Group B (n=50) – Dynamic Movement Skill

Group A (n=50) – Brain gym

Warm up – 5 min (Low speed stepping, Active stretching for both upper and Lower Limb)

Exercise duration: 25 min

- Lateralization: It issues the style the left and correct hemispheres interact. The cerebral hemisphere is specialized in sequent logical operations (language and logics), at constant time because the proper one allows us a holistic international ingenious and discerning of reality (tune and spatiality).

- Cross crawl (2 min) – members alternately flow their fingers closer to the alternative leg after which vice versa. This workout helps connection among hemispheres.

- Lazy 8's (2min) – The interest consists in drawing horizontal eights within the air along beside your hands. It activates mind and improves eye muscular tissues coordination, association among hemispheres and finding out speed.

- Double doddle (2min) – this can be a bilateral drawing interest that consists in sketching pics with every hand. It improves the mastering competencies data of writing symbols, writing system accurateness and Math's calculations.

- The Elephant (2min) – creating a giant time image with one arm at a time. This motion activates the inner ear for progressed stability and then integrates the mind for listening with each ear. It improves listening comprehension and attention-, short- and long-term memory, questioning ability.

Focalization: The Focalization physical activities assist individuals to increase and fortify the ones neural paths which hyperlink what they already know (which lays within side the again in their brain) with the capacity to system and specific the information (frontal lobe).

- The Owl (2min)– Bring one hand to contrary shoulder maintain a robust pinch across the trapeziius muscle among the neck and shoulder flip head to the identical aspect as hand is gripping and take a deep breath and relax. The owl motion enhances the visible and auditory skills. The owl lengthens neck and shoulder's muscle whilst re-setting up width of motion and facilitating the blood waft to the brain. It complements interest and memory.

- The lively arm (2min)–Bring the proper arm immediately up alongside the aspect of your head, carry the left arm up and wrap the hands across the immediately arm and press the arm towards the 4 hands to the proper for a be counted number of 8 and relax.

- The gravitational glider (2min) - Sit in a chair so that it will live nevertheless as you stretch ahead in it. Cross proper over left on the ankles. Take a deep breath in, exhale for a be counted number of 8 as you slowly lean ahead, palms stretching toward the ft and relax.

- The Rocker (2 min)- Sit without problems on ground, lean again onto your palms as carry your bent knees up and pass your ankles. Sacrum ought to be on floor, lightly rock your sacrum

making round movements. Make parent 8s, or the infinity image motion together along with your sacrum. It will increase the capacity of focus.

Centralization: These are more often than not rest physical activities which assist to re-set up the neural networks among mind and body. These sports assist the chemical and electric techniques which take vicinity in the course of intellectual and bodily efforts.

- Brain Button (2 min)–One hand rubdown spot under the clavicle whilst the opposite rests at the navel. Move your eyes and hand collectively for approximately 30 seconds, transfer fingers and hold for approximately any other 30 seconds. It turns on the mind for analyzing ability and memorization.

- Earth Button (2min) – One hand palms relaxation at the decrease lip whilst the others give up the navel together along with your palms are pointing downward and making touch with the stomach as well. Begin to softly rub each your chin and under your navel together along with your palms in small round movement. While rubbing either palm slowly flow the eyes in a directly vertical line up and down.

- Balance Button (2min)- Stand with toes hip distance apart, vicinity the proper hand lightly over the stomach and vicinity the center and pointer finger of the left hand at the bone proper at the back of the ear on temporal bone. Bend proper knee and raise foot off of the ground. Breathe lightly as your stability in your left leg for a be counted number of eight.

- Space Button (2min)- Stand with proper leg easily in the front of left vicinity the left center and pointer finger lightly onto the distance among nostril and higher lip. Place the lower back aspect of proper hand lightly on tail bone. Move each unit of palms in small round movement of their respective regions as you breathe and bend on the torso to appearance down at your proper foot. Switch legs and fingers and repeat steps greater time.

- Thinking Cap (1min) – Sit easily, beginning on the pinnacle of the ears, lightly clutch each ear among thumb and pointer palms. With simply sufficient stress to sense good, permit the thumb slide up and out off of the ear earlier than grabbing the subsequent piece of ear immediately under what became pulled. Slide the thumb off of the ear all of the manner right all the way down to the remaining a part of the lobe, giving the entire outer ear a pleasing rubdown.

Cool down: 5 min (Breathing Exercise, slow shoulder movements)

Group B (n=50) – Dynamic Movement Skill[31]

Warm up – 5 min (Low speed stepping, Active stretching for both Upper and Lower Limb)

Exercise duration: 25 min

- Quick-feet forward to A Left Lead (1 min) –

    - Start with both feet in the home box
    - with your left foot step onto ‘A’,
    - bring your right-foot to meet your left foot on ‘A’,
    - with your left-foot step backward to ‘Home’
    - with your right-foot, step back ward to ‘Home’
- Quick-feet forward to ARight Lead (1 min) –
    - Start with both feet in the home box
    - with your right-foot step onto ‘A’,
    - bring your left-foot to meet your right foot on ‘A’,
    - with your right-foot step backward to ‘Home’
    - with your left-foot, step back ward to ‘Home’
- Quick-feet backward to C Left Lead (1 min) –
    - Start with both feet in home box
    - With your left-foot step backward onto ‘c’
    - Bring your right-foot to meet your left-foot on ‘c’
    - With your left-foot step forward to ‘Home’
    - With your right-foot step forward to ‘Home’
- Quick-feet backward to C Right Lead (1 min) –
    - Start with both-feet in home box
    - With your right-foot step backward onto ‘c’
    - Bring your left-foot to meet your right foot on ‘c’
    - With your right-foot step forward to ‘Home’
    - With your left-foot step forward to ‘Home’
- Reverse-closed step to 3 with right-handed catch (2 min) –
    - Start with both feet in home box

  - Turn right with your right-foot step onto ‘3’
  - Left-foot should stay in home box
  - Catch the ball in your right-hand
  - With your right-foot step back to home.
- Reverse-closed step to 3 with left-handed catch (2 min) -
  - Start with both feet in home box
  - Turn left with your left-foot step onto ‘3’
  - Right-foot should stay in home box
  - Catch the ball in your left-hand
  - With your left-foot step back to home.

- Reverse-closed step to 4 with left-handed catch (2 min) -
  - Start with both feet in home box
  - Turn left with your left-foot step onto ‘4’
  - Right- foot should stay in home box
  - Catch the ball in your left- hand
  - With your left-foot step back to home.
- Reverse-closed step to 4 with right-handed catch (2 min) -
  - Start with both feet in home box
  - Turn right with your right -foot step onto ‘4’
  - Left foot should stay in home box
  - Catch the ball in your right hand
  - With your right -foot step back to home.
- Quick-feet to A with two handed catch left lead (2 min)-
  - Start with both feet in the home box

- with your left -foot step onto ‘A’,
- bring your right- foot to meet your left foot on ‘A’,
- with both your hands catch and throw the ball simultaneously
- with your left -foot step backward to ‘Home’
- with your right- foot, step back ward to ‘Home’

- Quick-feet to A with two handed catch right lead (2 min)-
  - Start with both feet in the home box
  - with your right-foot step onto ‘A’,
  - bring your left-foot to meet your right foot on ‘A’,
  - with both your hands catch and throw the ball simultaneously
  - with your right-foot step backward to ‘Home’
  - with your left-foot, step back ward to ‘Home’
- Quick-feet to D with two handed catch Left lead (2 min)-
  - Start with both feet in the home box
  - with your left-foot step onto ‘D’,
  - bring your right-foot to meet your left foot on ‘D’,
  - with both your hands catch and throw the ball simultaneously
  - with your left-foot step backward to ‘Home’
  - with your right-foot, step back ward to ‘Home’
- Quick-feet to B with two handed catch right lead (2 min)-
  - Start with both-feet in the home box
  - with your right-foot step onto ‘B’,
  - bring your left-foot to meet your right foot on ‘B’
  - with both your hands catch and throw the ball simultaneously
  - with your right-foot step backward to ‘Home’

- with your left-foot, step back ward to ‘Home’

- Quick-feet to A with two handed Juggle left Lead (2 min)-
  - Start with both feet in the home box
  - with your left-foot step onto ‘A’,
  - bring your right-foot to meet your left foot on ‘A’,
  - simultaneously you have to do 2 – handed juggle with ball
  - with your left-foot step backward to ‘Home’
  - with your right-foot, step back ward to ‘Home’
- Quick-feet to A with two handed Juggle right lead (2 min) -
  - Start with both feet in the home box
  - with your right-foot step onto ‘A’,
  - bring your left-foot to meet your right foot on ‘A’,
  - simultaneously you have to do 2 – handed juggle with ball
  - with your right-foot step backward to ‘Home’
  - with your left-foot, step back ward to ‘Home’
- Double leg jumps to C with two handed Juggle (1 min) –
  - Start with both feet in home box
  - Double leg jumps with both foot on ‘C”
  - simultaneously you have to do 2 – handed juggle with ball
  - With both foot jump back to home.

Cool down: 5 min (Breathing exercise, slow shoulder movements)

3. Outcome Measurements

3.1 Digit Memory Test

The digit memory check is classed into Digit Span Forward & Digit Span Backward Task. The process for the Digit span ahead assignment changed into that at first proposed via way of means of Hebb. The examiner declares an inventory of digits at a fee of regarding one digit in step with ordinal and topics are needed to promptly repeat the listing with within the identical order. If they win a listing

one digit longer is presented. If they fail, a 2nd listing of identical period is presented. If the priority could be a success on the other listing a listing one digit longer is given, as before. However, if topics in addition fail on the second one listing the check is ended. The duration of the digit sequences step by step increases, beginning with a sequence of three numbers (e.g.,3,5,8) to most of nine things (e.g., 7,1,3,9,4,2,5,6,8). The span is mounted as a result of the period of the longest listing recalled correctly. The identical method is employed for Digit span backward assignment, besides that in this instance topics got to reproduce the gathering of digits within the opposite order and therefore the longest listing includes eight items[21,22].

4. Statistical Inference

The t-test were performed to see mean distinction of pre and post-test comparison of Digit Forward and Digit Backward Task in A & B. P<0.01 that is extremely significant. Between group percent increase comparison were performed t-test and 1-tailed t-test.

Table 1: Comparing Pre & Post Test Scores Digit Forward Task in Group A

t-Test Result for Paired Datasets:						
Descriptive Statistics						
Variable	Mean	Std Dev.	Std Err	Lower 95% CL	Upper 95% CL	N
Pre-Test DF	5.000	0.9258	0.131	4.737	5.263	50
post-test DF	5.420	0.9495	0.134	5.150	5.690	50
1-tailed t-Test (Pre-Test DF < post-test DF)						
Ho. Diff	Mean Diff.	SE Diff.	"t" statistic value	DF	P value	
0.000	-0.420	0.071	-5.957	49.000	0.000	
			Significant		'p' < 0.01	

Inference

There is a significant difference between Pre-Test and post-test Group A DF values.

Post-test Group A DF scores [5.42] greater than Pre-Test Group A DF score [5.00]

Table 2: Comparing Pre & Post Test Scores Digit Backward Task in Group A

t-Test Result for Paired Datasets:						
Descriptive Statistics						
Variable	Mean	Std Dev.	Std Err	Lower 95% CL	Upper 95% CL	N
Pre-Test DB	3.140	0.948	0.134	2.871	3.409	50
post-test DB	3.780	1.130	0.160	3.459	4.101	50
1-tailed t-Test (Pre-Test DF < post-test DB)						
Ho. Diff	Mean Diff.	SE Diff.	"t" statistic value	DF	P value	
0.000	-0.640	0.080	-8.041	49.000	0.000	
			Significant		'p' < 0.01	

Inference

There is a significant difference between Pre-Test and post-test Group A DB values.

Post-test Group A DB scores [3.78] greater than Pre-Test Group A DB score [3.14]

Table 3: Comparing % increase in Post-Test Scores between Digit Forward and Digit Backward task in Group A

t-Test Result for Datasets:						
Descriptive Statistics						
Variable	Mean	Std Dev.	Std Err	Lower 95% CL	Upper 95% CL	N
% increase	9.100	11.118	1.572	5.940	12.260	50

in DF						
% increase in DB	22.367	22.840	3.230	15.876	28.858	50
1-tailed t-Test (% increase in DF < % increase in DB)						
Ho. Diff	Mean Diff.	SE Diff.	"t" statistic value	DF	P value	
0.000	-13.267	3.592	-3.693	70.986	0.000	
			Significant		'p' < 0.01	

Inference

There is a significant difference in post-test % increase values of Digital Forward and Digital Backward in Group A

% increase in DB post-test scores [22.367] greater than % increase in DF Post-Test scores [9.10]

Figure 2

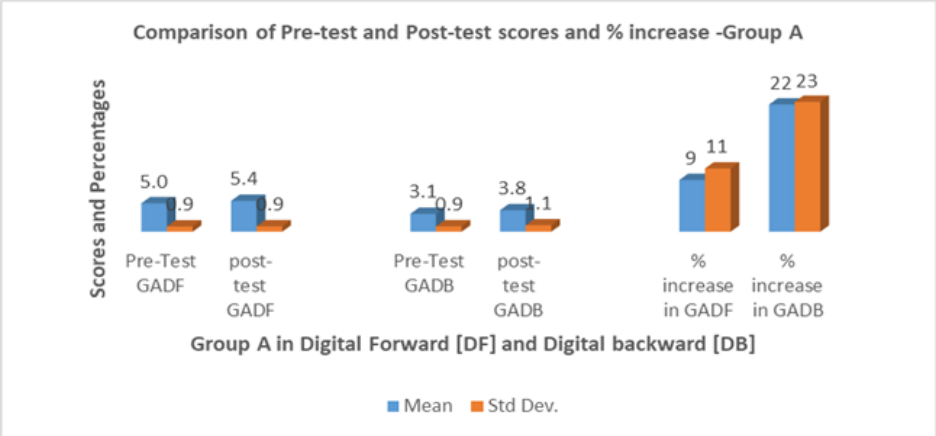


Table 4: Comparing Pre & Post Test Scores Digit Forward Task in Group B

t-Test Result for Paired Datasets:	

Descriptive Statistics						
Variable	Mean	Std Dev.	Std Err	Lower 95% CL	Upper 95% CL	N
Pre-Test DF	3.940	0.867	0.123	3.694	4.186	50
Post-Test DF	6.740	0.487	0.069	6.602	6.878	50
1-tailed t-Test (Pre-Test GBDF < post-test GB DF)						
Ho. Diff	Mean Diff.	SE Diff.	"t" statistic value	DF	P value	
0.000	-2.800	0.121	-23.099	49.000	0.000	
			Significant		'p' < 0.01	

Inference

There is a significant difference between PreTest and Posttest DB values .Post test group B DB values [6.14] greater than PreTest group B DB values [3.52]

Table 5: Comparing Pre & Post Test Scores Digit Backward Task in Group B

t-Test Result for Paired Datasets:						
Descriptive Statistics						
Variable	Mean	Std Dev.	Std Err	Lower 95% CL	Upper 95% CL	N
Pre-Test DB	3.520	1.054	0.149	3.220	3.820	50
Post-Test DB	6.140	0.881	0.125	5.890	6.390	50
1-tailed t-Test (Pre-Test DB< post-test DB)						
Ho. Diff	Mean Diff.	SE Diff.	"t" statistic value	DF	P value	
0.000	-2.620	0.114	-23.004	49.000	0.000	

			Significant		'p' < 0.01	

Inference

There is a significant difference between PreTest and Posttest DB values .Post test group B DB values [6.14] greater than PreTest group B DB values [3.52]

Table 6: Comparing % increase in Post-Test Scores between Digit Forward and Digit Backward task in Group B

t-Test Result for Datasets:						
Descriptive Statistics						
Variable	Mean	Std Dev.	Std Err	Lower 95% CL	Upper 95% CL	N
% increase in DF	79.467	41.907	5.927	67.557	91.376	50
% increase in DB	86.733	47.020	6.650	73.370	100.096	50
1-tailed t-Test (% increase in DF < % increase in DB)						
Ho. Diff	Mean Diff.	SE Diff.	"t" statistic value	DF	P value	
0.000	-7.267	8.907	-0.816	98.000	0.208	
			NOT Significant		'p' > 0.05	

Inference

There is NO vital distinction in post-test percent increase values of Digital Forward [DF] and Digital Backward [DB], in Group B% increase in Group B DF post-test scores [86.733] and % increase in Group B DB Post – test scores [79.467] almost same.

Figure 3

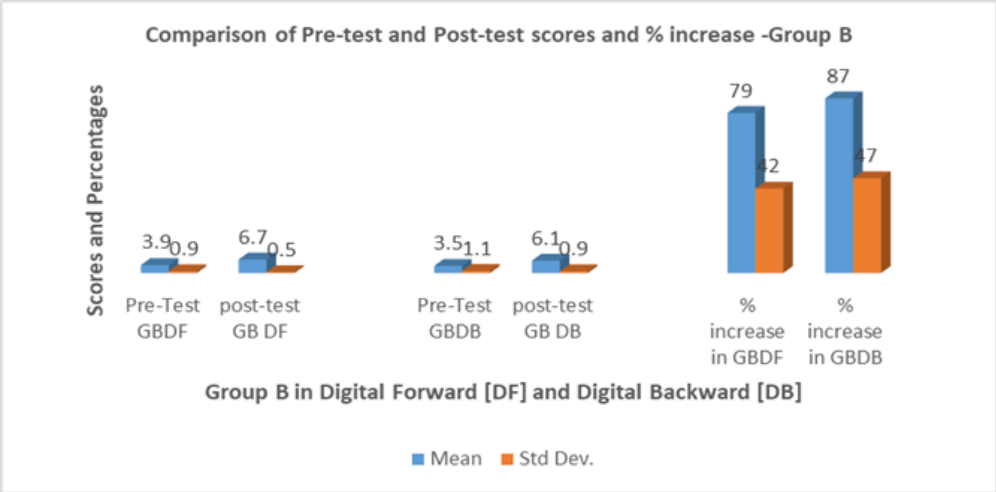


Table 7: Comparing % increase in Post-Test Scores of Digit Forward between Group A and Group B

t-Test Result for Datasets:						
Descriptive Statistics						
Variable	Mean	Std Dev.	Std Err	Lower 95% CL	Upper 95% CL	N
% increase in Group A DF	9.100	11.118	1.572	5.940	12.260	50
% increase in Group B DF	79.467	41.907	5.927	67.557	91.376	50
1-tailed t-Test (% increase in Group A DF < % increase in Group B DF)						
Ho. Diff	Mean Diff.	SE Diff.	"t" statistic value	DF	P value	
0.000	-70.367	6.132	-11.476	55.864	0.000	
			Significant		'p' < 0.01	

Inference

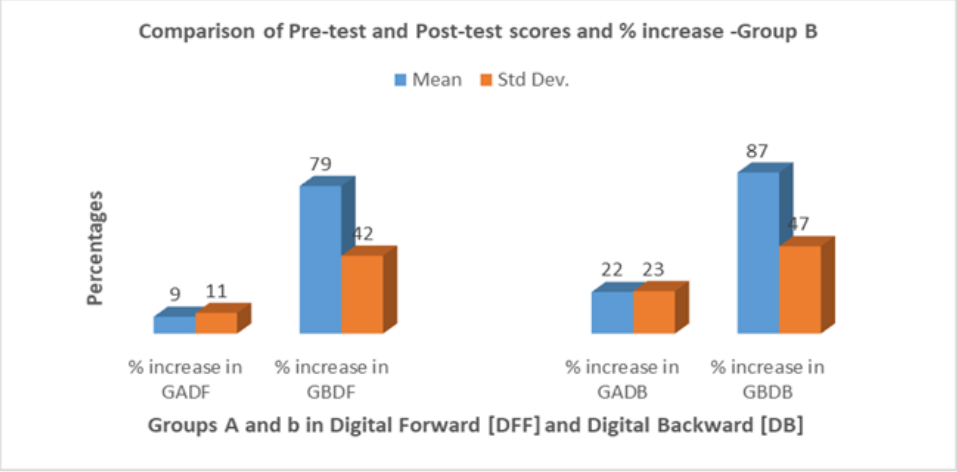
There is a major distinction in post-test percent increase values in Digital Forward between A and type B. % increase in Digital Forward post-test score [79.467] is a lot of in cluster B than % increase

in A [9.100]

Table 8: Comparing % increase in Post-Test Scores of DigitBackward between Group A and Group B

t-Test Result for Datasets:						
Descriptive Statistics						
Variable	Mean	Std Dev.	Std Err	Lower 95% CL	Upper 95% CL	N
% increase in Group A DB	22.367	22.840	3.230	15.876	28.858	50
% increase in Group B DB	86.733	47.020	6.650	73.370	100.096	50
1-tailed t-Test (% increase in Group A DB < % increase in Group B DB)						
Ho. Diff	Mean Diff.	SE Diff.	"t" statistic value	DF	P value	
0.000	-64.367	7.393	-8.707	70.904	0.000	
			Significant		'p' < 0.01	

Figure 4



Inference

There is a big distinction in post-test percent increase values in Digital Backward between group a and group b % increase in Digital Backward post-test score [86.733] is additional in group b than % increase in group a [22.367].

5. Result and Interpretation

From baseline to 12 Weeks a total of 60 Brain Gym Sessions and Dynamic Movement Skill sessions are offered to the participants in the intervention group. No adverse events were reported (or) observed over 12 weeks of study period.

General Characteristics:

There was no difference between the group in general characteristics. All participant had a high school or high education level.

Within Group Comparison of Outcome

When comparing pre & post – test scores of Group A and Group B Digit Forward and Digit Backward task are improved significantly $P<0.01$(Table 1,2,4,5). Comparing % increase in post-test between Digit Forward & Digit Backward in Group A improved significantly $P<0.01$ (Table 3). Comparing % increase in post test scores between Digit Forward and Digit Backward in Group B is not significant $P>0.05$ (Table 6).

Between Group % of Increase Comparison of Outcome

There is significant difference in post-test % increase values in Digit Forward and Digit Backward between Group A and Group B $P<0.01$. % increase in Digit Forward Post test score is 79.467 which is more in Group B than % increase in Group A - 9.100 (Table 7). % increase in Digit Backward post test score is 86.733 which is more in Group B than % increase in Group A – 22.367 (Table 8).

6. Discussion

Group scores of working memory performance before and after intervention

The Comparison of pre-test and post-test performance scores was done separately to see if there is a significant difference between working memory performance for both the intervention Group. Based on output analysis in Table (1,2,4,5) there is significant difference in working memory performance before and after intervention program $P<0.01$.

Brain Gym Intervention:

Based on Table (1,2) there' tremendous distinction with inside the operational memory overall performance ahead of and when the Brain gym intervention program $P<0.01$. supported Table 3, percent increase in Digit Backward post – take a look at score is larger than Digit Forward post – test score. It shows there's vital distinction in post – test % increase values of Digit Forward and Digit Backward task $P<0.01$

These findings demonstrate Brain gym intervention improve the memory overall performance rankings of the participants. the ultimate results of the analysis has valid that Brain gym intervention

have to be compelled to enhance operating memory overall performance in Middle Aged Women. The findings of this examine are supported by Dini Mei W et al. (2017)[23], Ah. Yusuf et al. (2015)[24], Kuntari et al (2016)[25], Bungawali Abduh et al. (2018)[1]which concluded that Brain gym intervention improve cognitive performance.

Dynamic Movement Skill Intervention:

The t-test were performed to work out mean distinction of pre and post-test comparison of Digit Forward and Digit Backward Task in group A & B. P<0.01 that is extremely significant. Between group percent increase comparison were performed using t-test and 1-tailed t-test Based on Table 6 % increase post – test scores of Digit Forward & Digit Backward scores were almost same. There is no significant difference in post – test % increase values of Digit Forward and Digit Backward in Group B P>0.05. Based on table 7 & 8 when comparing between the groups to determine which intervention is effective in working memory performance it shows that % increase in Digit Forward post – test score 79.467 is more in Group B than % increase in Group A (9.100) and % increase in Digit Backward post test score 86.733 is more in Group B than % increase in Group A (22.367). Hence, it shows that both the intervention had a significant improvement in working memory performance but Dynamic Movement Skill showed a greater performance than Brain Gym.

The findings of this study are just like a few preceding research displaying tremendous effects after imposing the motor practice. The findings on this have a look at are supported via way of means of Catherine – Alexandra Gregoire et.al (2019)[26], Casper de Boer et.al (2018)[5], Liuyang Cai et.al (2014)[6]. The running reminiscence ability is related to altered connectivity among the fronto parietal community and each parietal cortex and inferior temporal cortex is increased. In Consequences their attention stage additionally enhancing primarily based totally at the reality that running reminiscence is related to the cappotential to pay attention selectively (Kreitz et.al., 2015)[1].

Ageing associated distinction in cognition had been display in conversion from center age (50) to antique age (65). Several age – associated variations had been show off earlier than the age of 50. Middle age is the ideal window, if we deliver right motor practice & bodily Movement intervention on the earliest time we will save you or submit pone the Dementias, Mild Cognitive Impairment and Alzheimer's ailment of their antique age [27,28,29,30]. Neural Plasticity is functionality of the mind to change, to restore and to reorganize itself. Through motion, mind constantly construct new mind cells. It does this while it's far inspired and challenged to analyze some thing new and reacts with CNS to create new connections. This is known as synaptic plasticity. This system generates a protein known as BDNF. It facilitates with the boom and subsistence of Neurons. One of the captivating discoveries of the brand new Neuro-Scientific studies is the impact that workout and motion has on cognitive getting to know. By combining uncommon or New moves that require us to pay attention and via way of means of the usage of as a few of the body's drivers as possible (arm, legs & head). We can project and initiate the getting to know system. This kind of motion is at once connected to an development of cognitive system like awareness and memory enhancement[6]. Neural Plasticity is therefore a biological foundation to the learning brain. Experience dependent changes in the lower neocortical region can reshape the activation pattern and the anatomy of cerebral cortex (Wall et al., 2002). Sensory input, knowledge and motor

learning activities stimulate cortical changes (Rakie., 2002; Taubertet al., 2010). In skill learning or repeated exposure to stimulations and experiences, relevant neurons often fire together and wire together. The associated neurons of a given response will be activated simultaneously in response to similar stimuli in the future. Learning endeavours or experiences modify the existing cortical structures or mechanism via neurogenesis, gliogenesis and synaptogenesis[6].

7. Conclusion

This study involving Motor Practice to measure the working memory performance on Middle Aged Women. Both Brain Gym and Dynamic Movement Skill intervention shows an improvement of working memory Performance in Middle Aged Women. Dynamic Movement Skill had more improvement than Brain Gym.

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APPENDIX 1

MCS - MEMORY COMPLAINT SCALE		
VERSION A - PATIENT ANSWERS		
Objective: To assess patient's memory complaint directly with him/her		
Instructions: • Apply this directly to patient with no intervention from companion • Read aloud in a clear voice		
Q1. Do you have any memory problems? (or "forgetfulness?" or "memory difficulties")		
( ) No = 0	( ) Unable to answer/unsure/doubt = 1	( ) Yes = 2
If answers No, mark 0 and likewise for Q2 and Q3 and skip ahead to Q4		
Q2. How often does this happen?		
( ) Rarely = 0	( ) Occasionally/sometimes =1	( ) A lot/frequently = 2
Q3. Does this memory problem hamper (or impair) your daily activities?		
( ) No = 0	( ) Occasionally/sometimes = 1	( ) A lot /frequently = 2
Q4. How is your memory compared to others your age?		
( ) The same or better = 0	( ) Somewhat worse = 1	( ) Much worse = 2
Q5. How is your memory compared with when you were younger?		
( ) Same or better = 0	( ) Somewhat worse = 1	( ) Much worse = 2
Q6. Do you forget what you've just read or heard (e.g., in a conversation)?		
( ) Rarely/never = 0	( ) Occasionally = 1	( ) Often = 2
Q7. Rate your memory on a scale of 1 to 10, with 1 worst and 10 best		
( ) 9 or 10 = 0	( ) 5 to 8 = 1	( ) 1 to 4 = 2
Scoring		
Interpretation		
[ ] No MCs (0-2)	[ ] Mild MCs (3-6)	[ ] Moderate MCs (7-10) [ ] Severe MCs (11-14)

MCS - MEMORY COMPLAINT SCALE		
VERSION B - COMPANION ANSWERS ABOUT PATIENT		
Objective: To assess memory complaint of patient by companion report		
Instructions: • Apply with the companion referring to patient • Read aloud in clear voice		
Q1. Does he/she have a memory problem ? (or "forgetfulness?")		
( ) No = 0	( ) Unable to answer/unsure/doubt = 1	( ) Yes = 2
If answers No, mark 0 and likewise for Q2 and Q3 and skip ahead to Q4		
Q2. How often does this happen?		
( ) Rarely = 0	( ) Occasionally/sometimes =1	( ) A lot /frequently= 2
Q3. Does this memory problem hamper (or impair) his/her daily activities?		
( ) No = 0	( ) Occasionally/sometimes = 1	( ) A lot /frequently = 2
Q4. How is his/her memory compared to others their age?		
( ) The same or better = 0	( ) Somewhat worse = 1	( ) Much worse = 2
Q5. How is his/her memory compared with when they were younger?		
( ) The same or better = 0	( ) Somewhat worse = 1	( ) Much worse = 2
Q6. Does he/she forget what they've just read or heard (e.g., in a conversation)?		
( ) Rarely/never = 0	( ) Occasionally = 1	( ) Often = 2
Q7. Rate his/her memory on a scale of 1 to 10, with 1 worst and 10 best		
( ) 9 or 10 = 0	( ) 5 to 8 = 1	( ) 1 to 4 = 2
Scoring		
Interpretation		
[ ] No MCs (0-2)	[ ] Mild MCs (3-6)	[ ] Moderate MCs (7-10) [ ] Severe MCs (11-14)

APPENDIX 2

Data Collection Sheet

NAME:_____ DATE:_____

HEIGHT:_____in. WEIGHT:_____lbs. AGE:_____

PHYSICIANS NAME:_____ PHONE:_____

PHYSICAL ACTIVITY READINESS QUESTIONNAIRE (PAR-Q)

	Questions	Yes	No
1	Has your doctor ever said that you have a heart condition and that you should only perform physical activity recommended by a doctor?		
2	Do you feel pain in your chest when you perform physical activity?		
3	In the past month, have you had chest pain when you were not performing any physical activity?		
4	Do you lose your balance because of dizziness or do you ever lose consciousness?		
5	Do you have a bone or joint problem that could be made worse by a change in your physical activity?		
6	Is your doctor currently prescribing any medication for your blood pressure or for a heart condition?		
7	Do you know of any other reason why you should not engage in physical activity?		

If you have answered "Yes" to one or more of the above questions, consult your physician before engaging in physical activity. Tell your physician which questions you answered "Yes" to. After a medical evaluation, seek advice from your physician on what type of activity is suitable for your current condition.