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## ORIGINAL

# NEUROBIOLOGICAL EFFECTS OF REGULAR PHYSICAL ACTIVITY ON COGNITIVE FUNCTION IN ELDERLY POPULATIONS

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### ABSTRACT

The study explores the effect of neurobiological research on regular physical activity research based on primary data analysis. These data were collected through different questions related to physical activity and cognitive function. The elderly person is considered a research sample for measuring the study using SPSS software, and the run result included descriptive statistics, model summary, correlation coefficient, and linear regression analysis between neurobiological and cognitive function. Physical activity helps older people to improve their cognitive functions as the release of different growth factors, which include IGF-1, VEGF and BDNF, increases, and these factors pass towards the brain. The cascade of growth factors as a result of physical activity promotes health benefits to brain function. It was demonstrated that while having physical activity, the growth factor BDNF, also secreted from the brain cells and muscle contraction during exercise, promotes the release of myokines, irisin and cathepsin B, which increase the production of growth factors in the hippocampus area of the brain. This improves the cognitive abilities of elderly persons. Overall, the research found a significant neurobiological effect of regular physical activity.

**KEYWORDS:** Neurobiological (N), Regular Physical Activity (RPA), cognitive Function (CF), Elderly Population (EP)

### 1. INTRODUCTION

Physical activity can be termed as the movement of body parts to have energy expenditure because of skeletal muscle contractions, whereas exercise is the subcategory of physical activity in which planned and repetitive activities

are performed to gain a required goal of physical fitness. Physical activity is significant for the fitness, cognitive functions, and regulation of various health issues. These benefits are most importantly related to fitness in elderly people because, with age, elderly people face several changes in functionality that can impact the regulation of daily activities. The advantages of physical fitness range from cardiovascular functions, mental fitness, and health conditions to muscle strength and body composition regulation (Marmeleira, 2013). Several studies are being performed to build a promising linkage between daily physical activity and the cognitive function of elder people. Evidence has proven that elderly people who are involved in daily physical activity show better cognitive function and performance than those who are not engaged in any physical activity. With daily exercises, elder people improve cognitive function by better processing of information, improved visual impacts, and an enhanced attention span. Physiologically, cognitive enhancement occurs by an increase in cerebral metabolism, the transmission of neurons, the development of brain cortical structures, and glucose regulation. Moreover, physically active elderly people also show a decrease in oxidative stress and maintain the required oxygen availability to the brain, improving cognitive function (Young, Sheets, & Paul, 2013) Marmeleira. The maintenance of mood, depression, mental stress, and control processes is another outcome of managing physical fitness. The power of physical activity affects health and has an important role in regulating complex processes of brain structure, which in turn play a role in managing psychological wellbeing (Arbonés, Marcén, Piedrafita, & Gómez-Gonzalvo, 2023). The relation between aerobic fitness and cognitive performance can be better understood by the cardiovascular hypothesis that depicts a positive linkage between physical fitness and brain functionality. According to this theory, if physical activities are performed regularly by elderly people, then aerobic fitness has a positive impact, improving brain performance (Chen & Nakagawa, 2023). This is because physical activity ensures the amended blood flow to the cerebral parts and manages complex mechanisms like brain-derived neurotrophic factors, collectively associated with cognitive performance. The levels of brain-derived neurotrophic factors are increased due to physical activity, which contributes to positive changes in cerebral structures. Numerous cross-sectional studies are being performed that assure the linkage of physical fitness with better cognitive gains in elder people. However, researchers also show that physical fitness's impact on aerobic fitness can vary among age groups of older people and can, therefore, show different results (Ploughman, 2008). Another hypothesis has been put forward in this regard, which is termed the "cerebral circulation hypothesis", according to which there is an important linkage between the regulation of glucose and oxygen supply and the cognitive function among older people. The brain is one significant organ of the body that occupies less than 2% of the body's space but requires 20-25% of the body's oxygen and glucose supply for normal functioning (Kramer & Erickson, 2007). However, the brain is incapable of storing or producing oxygen or glucose and,

therefore, requires the body's vascular system to be active enough for the constant and efficient supply of oxygen and glucose to make regulation and neurotransmission possible. Therefore, the cerebral circulation hypothesis declares that physical activity helps in the regulation of oxygen and glucose transportation to the brain, thereby ensuring the regulatory function of the brain by providing abundant resources to the cerebral parts (Nithianantharajah & Hannan, 2009). This hypothesis is relevant to older people because, with age, the blood delivery to the central nervous system gets reduced due to increased blood plasma viscosity, reduction in vascular elasticity, and conditions like fibrosis. Research shows that elderly people engaged in physical activity are less likely to reduce their cognitive functionality as their oxygen and glucose supply doesn't face much hindrance (Bherer, 2015). Also, a better supply of oxygen and glucose can help show better reaction times in elderly individuals. Their memory also only degrades a little compared to those who are physically inactive. The enhanced and increased brain-derived neurotrophic factor due to physical activity is because of the amplified synaptic structure of the brain and greater plasticity. The brain-derived neurotrophic factor increases as physical activity increases, ultimately adding to better plasticity. In elder people, brain-derived neurotrophic factor is important as it increases the health of glutaminergic neurons which help the neurogenesis process and ultimately give rise to the learning mechanism and mental performance (Gregory, Parker, & Thompson, 2012; Yuing Farías, Henríquez Flores, Pradanos Salomon, Cortés Villalobos, & Curilem Gatica, 2019).

Neurotrophins are involved in brain-derived neurotrophic factors and are highly accumulated in the hippocampus of the brain. If elder people engage in daily exercises, the neurotrophin level boosts up and helps in the rise of other factors like insulin, etc. This rise in factors collectively helps in managing neurogenesis and also aids in the protection of the brain from injury (Erickson et al., 2019). The plasticity of the brain is improved by mobilizing the gene expression profiles that are encoded by neurotrophins and other proteins. Physical activity promotes anatomical changes and helps in the plasticity of the brain. The more physical fitness there is, the more aerobic fitness there is, and ultimately, there is a massive vastness in the grey and white matter areas of the brain. Moreover, the increased physical activity helps reverse the loss of the hippocampus in the brain of elderly people and thereby contributes to improved memory (Heinze et al., 2021). Hence, the increase in physical activity shows a positive impact on the cognitive function of elder people who face major bodily and functionality changes after hitting a certain age. Studies urge that these changes can be reduced and a better life can be maintained if elder people start engaging in a productive and physically active lifestyle. The studies explain how regular physical activity affects cognitive function neurobiologically. There are five sections in the study article. The introduction to the neurobiological impacts of regular physical exercise is presented in the first section. The literature review is covered in the second section, and the technique is shown in the third

section. The findings and their explanations are presented in the fourth section, and suggestions about the subject are summarized and presented in the last section.

## 2. Literature Review

Scholar studies reveal that active work is one of the modifiable elements of mental deterioration and dementia with the most grounded proof. Researchers similarly examined a few issues significant for endorsing actual work, including what power and method of active work brings the most mental advantages. This study then, at that point, gave an outline of the activity physiology and further showed that the body's variations to upgrade practice execution also benefit the mind and add to work on mental execution (Chen & Nakagawa, 2023). Researchers looking at the force of activity expected to advance neurotrophins propose that control is significant. Supported expansions in neurotrophins levels happen with delayed low-power workout, while higher force works out in a rodent model of cerebrum injury raises the pressuring chemical corticosterone. Obviously, moderate active work is significant for youth whose cerebrums are profoundly plastic and maybe considerably more basic for youngsters with actual inability (Ploughman, 2008). Scholars conducted an efficient survey looking at the impacts of activity on mental capability in more established people and presented potential systems by which actual work might further develop perception. The lion's share of proof proposes that actual work is valuable for mental capability in the old. Be that as it may, most of the proof is of mid-range quality with a moderate gamble of inclination. Bigger randomized controlled preliminaries are expected to explain the relationship between practice and mental capability and determine which kinds of activity have the best advantage on unambiguous mental spaces (Carvalho, Rea, Parimon, & Cusack, 2014). Researchers reveal that active work emphatically impacts cerebrum well-being and mental work in more established grown-ups. A few physiological and mental systems have been recognized to underlie such a relationship. This writing audit demonstrates that the kind of activity and its particular perceptual and mental attributes might impact mental execution (Marmeleira, 2013). Studies assess the speculation that actual work and exercise could safeguard and improve mental and cerebrum capability across the grown-up life expectancy.

Scientists infer that actual work is an economical treatment that could have significant precaution and helpful properties for mental and mind capability (Kramer & Erickson, 2007). Studies suggest that actual work is a successful strategy for exploiting cerebrum versatility. A few mind regions and mental spaces are more reliably impacted by actual work than others. Expanding actual work and wellness is a promising way to deal with upgrade cerebrum and discernment in youngsters and more established grown-ups (Erickson, Hillman, & Kramer, 2015). Studies claim that mental preparation,

active work, and exercise have frequently been accounted for in working on mental execution in more seasoned grown-ups. By and large, results explored here help the idea that mental pliancy for attentional control, as prompted by mental preparation or active work and exercise, is saved in late adulthood. In addition, the consequences of studies with patients in danger of mental degradation also recommend that mental preparation and exercise mediations are promising nonpharmaceutical apparatuses to assist with further developing perception in more established in danger people(Bherer, 2015). Scholars explain that active work could significantly impact mental cerebrum capabilities including learning and memory.

The consequences of epidemiological examinations (cross-sectional, planned and reviewed) support a positive connection between discernment and proactive tasks(Lista & Sorrentino, 2010). Scholars suggest that Neurodegenerative infections are a gathering of pathologies that cause serious handicaps due to engine and mental impediments. Specifically, mental weakness is a developing well-being and financial issue which is as yet hard to manage today. In this spellbinding outline researchers feature the neurobiological impacts of actual activity, which can advance brain adaptability and neuroprotection by acting at the cytokine and hormonal level, and the subsequent positive clinical consequences for patients experiencing mental disability(Fari et al., 2021). Researcher studies reveal that results are reliable with creature models of activity and the mind; they are quick to show in people that work out actuated expansions in worldly curve useful networks are related with changes in development factors and might be expanded by more noteworthy standard Vascular endothelial growth factor(Voss et al., 2013). Researchers describe the Impacts of the mediations on mental results, which will be depicted in expectation to-treat and per convention examinations. Scholars will also examine expected hereditary, segment, mind, and physiological atomic connects that might anticipate the impacts of mediation and the relationship between mental impacts and changes in these factors utilizing the per convention test(Castells-Sánchez et al., 2019). Scholars' review proposes that active work and exercise can further develop insight into more seasoned grown-ups with Promotion. While the accompanying consequences for cognizance elements of high recurrence intercessions was not more prominent than that of low recurrence mediations, the edge still needs to be settled. Anyhow, more Randomized Control Trials with thorough review configurations are expected to help our discoveries(Jia, Liang, Xu, & Wang, 2019). Studies elaborate that mental capability is debilitated, and the gamble of dementia is expanded and affected by typical or obsessive cortical and subcortical neuronal changes.

Besides, coordination practice invigorates mental capability, inciting positive transformations of cerebral capability when routinely rehearsed. The



potential impacts of different kinds of activity that feebly animate the cardiovascular framework or mental capability, for example, extending and strength preparation, are additionally helpful, yet their unthinking clarifications require further investigation(Paillard, 2015). This survey is widely centered around upgrading mental capabilities while performing activities ordered into cardiovascular activities, obstruction preparation, hand-to-hand fighting, racquet sports, moving and mind-body works. This audit shows that distinctions are available in mental work while at the same time changing the sort of actual work performed(Srinivas, Vimalan, Padmanabhan, & Gulyás, 2021). Studies show that normal actual activity improved acknowledgement memory and diminished pressure. Impacts were just distinguished in members who practised on the last day of testing. An intense, single episode of activity didn't influence memory. Work out actuated changes in comprehension were not associated with temperament/uneasiness(Hopkins, Davis, VanTieghem, Whalen, & Bucci, 2012). Studies explain that past examinations have recommended helpful impacts of active work on cognizance. Researchers showed that actual work conveys the helpful impacts on memory capability autonomously of its power, perhaps interceded by nearby dim matter volume and neurotrophic factors. Study discoveries might convey critical ramifications for anticipating mental degradation in the old(Ruscheweyh et al., 2011).

The motivation behind the current review was to survey the capability of exergame preparation in light of truly reproduced sports play as a method of actual work that could have mental advantages for more established grown-ups. It was empowering to see that commitment to genuinely mimicked sports games yielded advantages to mental and actual abilities that are straightforwardly associated with useful capacities that more established grown-ups need in regular living(Maillot, Perrot, & Hartley, 2012). Researchers determine that past examinations have demonstrated that a functioning way of life is related to better mind wellbeing and a more extended life, contrasted with a more inactive way of life. For human and creature subjects, these examinations have regularly centred around a solitary movement, which is normally an actual activity. However, different exercises have gotten a rising interest. These outcomes unequivocally propose that mental preparation can significantly impact cerebrum well-being in a more seasoned grown-up(Ledreux et al., 2019). Researchers investigate that actual activity further develops perception, especially consideration, memory, and leader capabilities. In any case, the systems that hide these impacts still can't seem to be completely perceived. Here, scholars featured that actual work actuated massive changes in utilitarian mind enactment and mental execution in each age bunch and could balance mental issues and brain decline(Festa, Medori, & Macrì, 2023). Scholars reveal that expanding actual work is one of the most encouraging and provoking intercessions to postpone or forestall mental degradation and dementia.

The expectation-to-treat investigations show that the mediation, contrasted with control, expands the degree of active work yet affects actual wellness and comprehension (Galle et al., 2023). Researchers suggest that maturing is related to decreases in mental cycles, especially in the areas of chief capability, rambling memory, and handling speed. Chief capabilities are significant for arranging, starting and keeping up with complex objective-orientated conduct. Scholar discoveries propose that active work might connect rest, mental capability, and cerebrum (Sewell et al., 2023). Scholars elaborate that engine action during a formative age is, as a matter of fact, a vital device for the physical and mental development of youngsters, both capable and impaired. Through development, people can work on their actual productivity and advance their own better well-being, layout associations with the climate, and others put themselves out there and their feelings, structure their character and foster mental cycles (Latino & Tafuri, 2024). Researchers assess the survey's proof of the job of practice in working on mental capabilities in the older. It investigates hypothetical models making sense of the effect of activity on comprehension and assesses various kinds of activity, for example, oxygen consumption, strength preparation, and yoga.

The writing stresses the requirement for customized practice programs given individual capacities and natural contemplations to upgrade mental advantages (Faraziani & Eken, 2024). This complete examination dives into the diverse effect of maturing on neurological capability and mental degradation, integrating experiences from concentrates on music, computer games, and care. The concentrate additionally analyzes the cerebrum's underlying and practical advancement with age, especially in the hippocampus and cerebrum, and the resultant impacts on mental capacities. This exploration highlights the perplexing transaction of hereditary, way of life, well-being, and mediation factors in maturing. It underscores the significance of custom-made mediations, for example, utilizing music treatment, computer games, and way-of-life changes to protect neurological and mental well-being in more established grown-ups (Al Matared et al., 2024). Scholars show that concentrates across numerous nations uncover that downturn and rest issues can prompt mental degradation. This study aims to hypothesise about the effects of different indoor air pollution sources on perception as well as look into the effects of depression and sleep problems on cognizance while exposed to indoor air pollution. Among more experienced adults, messy cooking practices, indoor smoke (from incense sticks and mosquito loops), and passed-down cigarette smoke were strongly linked to sleep issues and depression (Shaw, Kundu, Chattopadhyay, & Rao, 2024).

### **3. Methodology:**

The study indicates that regular physical activity has neurobiological

effects on cognitive function in older populations. The research study employed SPSS software to analyse primary data and provide results, which comprised a descriptive statistic, correlation coefficient, model summary, and linear regression analysis between the variables. The conclusion is that people's brains deteriorate with age. Studies have shown that the brain's capacity to produce new neurons and the mass of the hippocampus, a region of the brain where neurogenesis occurs, decrease with age (typically beyond the thirties). Additionally, oxidative stress and neuroinflammation also increase as people age. With all these factors cognitive functions such as memory and fluid ability start declining and the chances of Alzheimer's disease (a brain disorder that comprises 60-70% of dementia) increase. It is studied that as the population of the world becomes older, the risk of Alzheimer's disease increases globally. During the COVID-19 pandemic situation worsened as lockdowns increased the cognitive problems among healthy persons, persons having mild cognitive disorders and patients suffering from Alzheimer's disease. Therefore it is crucial to apply the strategies that help in improving brain health (Chen & Nakagawa, 2023). There are several studies present in the discussion about the link between physical activity and the functions of cognitive abilities. Many studies revealed that implementing physical activity improves cognitive functions for instance it reduces the risk of cognitive disorder by 35-38%, the risk of Alzheimer's disease by 13-35% and the risk of dementia by 14-17%. Many other studies also demonstrated that exercise improves memory, processing functions, execution speed and consideration in the brain.

In older people, aerobic exercises improve cognitive function and memory speed of the brain. Thus it was verified that physical activity improves brain function in elder people. When physical activity for the brain is done, the body creates many changes that support exercise enactment for instance, the brain releases different factors including, brain regulatory factors like Brain-derived neurotrophic factor (BDNF), insulin-like - growth factors (IGF) and vascular endothelial-- -growth factor (VEGF). Additionally, lactate formation and improvement in mitochondrial biogenesis, anti-oxidative activity of enzymes, and release of different neurotransmitters like dopamine and serotonin have also been observed with the help of physical activity. BDNF factor is released from brain platelets and endothelial tissues during physical activity. It stimulates the utilization of glucose in the body through insulin excretion, improves oxidation of lipids through the protein kinase cycle and also assists in the repairing and remodeling of tissues. IGF factors are secreted from the areas of the liver and skeletal muscles. These factors help in the metabolism of carbohydrates and fats in the body as they act on insulin growth hormone. Lastly, the VEGF released while having physical activity is secreted from the lungs, brain and skeletal muscles. Factors, IGF and VEGF help in tissue repair and eventually help in supplying oxygen to all muscles and improve their functions.





**Figure 1:** Neurobiological Effects

The maximum ability of growth factors to release with the help of physical activity in elderly persons performs different functions in the body such as BDNF helps in survival, growth and repairing of neuron cells and neurogenesis. It also promotes the cognitive flexibility, synaptic strength and memory. Additionally, BDNF also stimulates neurogenesis in the hippocampus area. Neurogenesis occurs at the angiogenic place where there is a need for oxygen and nutrients. The other two growth factors, IGF-1 and VEGF, stimulate neurogenesis and angiogenesis. The factors IGF-1 and BDNF, furthermore, stimulate the development of dendritic spines where synaptic input occurs and dendritic convolution (see Figure 1).

#### 4. Results and Descriptions

**Table 1:** Result of Descriptive Statistics

DESCRIPTIVE STATISTICS					
	N	MINIMUM	MAXIMUM	MEAN	STD. DEVIATION
NEUROBIOLOGICAL EFFECTS 1	51	1.00	3.00	1.5686	.57463
NEUROBIOLOGICAL EFFECTS 2	51	1.00	3.00	1.4314	.53870
NEUROBIOLOGICAL EFFECTS 3	51	1.00	3.00	1.4118	.57189
REGULAR PHYSICAL ACTIVITY	51	1.00	3.00	1.3137	.54736
COGNITIVE FUNCTION 1	51	1.00	4.00	1.4902	.64413
COGNITIVE FUNCTION 2	51	1.00	3.00	1.3333	.51640
VALID N (LISTWISE)	51				

The results of table 1 shown above illustrate how descriptive statistical analysis may be used to characterize the lowest and maximum values as well as the standard deviation rate of each variable, including the impacts on neurobiology and cognitive function. Overall, 1.000 is the smallest value and 4.00 is the greatest number. the impacts of neurobiology 1, 2, and 3. The neurobiological effects 1, 2, and 3 mean values are 1.5686, 1.4314, and 1.4118, respectively, indicating a positive average value. With a 53% variation from the mean, the standard deviation rate is 57%. According to the results, regular physical activity acts as a mediator variable. Its mean value is 1.313, and its standard deviation rate is 54% departure from the mean. The dependent variables, cognitive function 1 and 2, had mean values of 1.4902 and 1.333, respectively, based on the results. There is a 51% divergence between them and a 64% standard deviation rate.

**Table 2 (a):** Result of Correlations

<b>CORRELATIONS</b>		<b>NEUROBIOLOGICAL EFFECTS 1</b>	<b>NEUROBIOLOGICAL EFFECTS 2</b>	<b>NEUROBIOLOGICAL EFFECTS 3</b>	<b>REGULAR PHYSICAL ACTIVITY</b>	<b>COGNITIVE FUNCTION 1</b>	<b>COGNITIVE FUNCTION 2</b>
<b>NEUROBIOLOGIC AL EFFECTS 1</b>	Pearson Correlation	1	-.098	.430**	-.070	-.120	.022
	Sig. (2-tailed)		.496	.002	.626	.403	.876
	N	51	51	51	51	51	51
<b>NEUROBIOLOGIC AL EFFECTS 2</b>	Pearson Correlation	-.098	1	-.069	.346*	-.333*	-.168
	Sig. (2-tailed)	.496		.632	.013	.017	.239
	N	51	51	51	51	51	51
<b>NEUROBIOLOGIC AL EFFECTS 3</b>	Pearson Correlation	.430**	-.069	1	-.101	-.070	-.068
	Sig. (2-tailed)	.002	.632		.479	.624	.637
	N	51	51	51	51	51	51

Table 2 (b): Result of Correlations

CORRELATIONS		NEUROBIOLOGICAL EFFECTS 1	NEUROBIOLOGICAL EFFECTS 2	NEUROBIOLOGICAL EFFECTS 3	REGULAR PHYSICAL ACTIVITY	COGNITIVE FUNCTION 1	COGNITIVE FUNCTION 2
<b>REGULAR PHYSICAL ACTIVITY</b>	Pearson Correlation	-.070	.346*	-.101	1	-.105	-.165
	Sig. (2-tailed)	.626	.013	.479		.465	.247
	N	51	51	51	51	51	51
<b>COGNITIVE FUNCTION 1</b>	Pearson Correlation	-.120	-.333*	-.070	-.105	1	.220
	Sig. (2-tailed)	.403	.017	.624	.465		.120
	N	51	51	51	51	51	51
<b>COGNITIVE FUNCTION 2</b>	Pearson Correlation	.022	-.168	-.068	-.165	.220	1
	Sig. (2-tailed)	.876	.239	.637	.247	.120	
	N	51	51	51	51	51	51

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

Pearson Correlation is described as a significant value in the correlation coefficient analysis results of table 2, and it also explains the number of observation rates of each variable, including independent and dependent variables. There is a 43% positive and a 0.002 2% significant analysis between them, according to the neurobiological effects. Overall, the findings indicate that there are both positive and negative consequences between independent and dependent parties.

#### 4.1 Chi square Analysis:

**Table 3:** Result of Test Statistics

TEST STATISTICS						
	NEUROBIOLOGICAL EFFECTS 1	NEUROBIOLOGICAL EFFECTS 2	NEUROBIOLOGICAL EFFECTS 3	REGULAR PHYSICAL ACTIVITY	COGNITIVE FUNCTION 1	COGNITIVE FUNCTION 2
<b>CHI-SQUARE</b>	19.882 <sup>a</sup>	25.529 <sup>a</sup>	26.471 <sup>a</sup>	38.235 <sup>a</sup>	46.490 <sup>b</sup>	34.353 <sup>a</sup>
<b>DF</b>	2	2	2	2	3	2
<b>ASYMP. SIG.</b>	.000	.000	.000	.000	.000	.000

The chi square analysis result of table 3 described above shows that the chi square values and significant value. According to the neurobiological effects 1, 2, and 3, the chi square value is 19.882, and the chi square rates are positive at 25.529 and 26.471. According to the cognitive function 1 and 2, there is a 100% significant degree of difference between them, with a 46.490 and 34.353 positive chi square significant value of 0.000.

**Table 4:** Result of Model Summary

MODEL SUMMARY				
MODEL	R	R SQUARE	ADJUSTED R SQUARE	STD. ERROR OF THE ESTIMATE
1	.368 <sup>a</sup>	.136	.060	.62438

a. Predictors: (Constant), Regular Physical Activity, Neurobiological Effects 1, Neurobiological Effects 2, Neurobiological Effects 3

The model summary of table 4 provided by the preceding result illustrates the R value, R square value, modified R square, and error associated with standard estimate. The R square value of 0.136 and the R value of 0.368 indicate that, respectively, 13% and 62% of the expected value are present.

**Table 5:** Result of ANOVA<sup>a</sup>

<b>ANOVA<sup>a</sup></b>						
<b>MODEL</b>		<b>SUM OF SQUARES</b>	<b>DF</b>	<b>MEAN SQUARE</b>	<b>F</b>	<b>SIG.</b>
<b>1</b>	Regression	2.812	4	.703	1.803	.144 <sup>b</sup>
	Residual	17.933	46	.390		
	Total	20.745	50			

a. Dependent Variable: Cognitive Function 1

b. Predictors: (Constant), Regular Physical Activity, Neurobiological Effects 1, Neurobiological Effects 2, Neurobiological Effects 3

The above result of table 5 represent the ANOVA value included sum of square, mean square also that F statistic and significant value. The regression show that sum of square value is 2.812 its residual value is 17.933 also that total value is 20.745 respectively. The mean square rate is 70%, and 39% the significant value is 14% significantly level between them.

**Table 6:** Result of Coefficients<sup>a</sup>

<b>COEFFICIENTS<sup>a</sup></b>						
<b>MODEL</b>		<b>UNSTANDARDIZED COEFFICIENTS</b>		<b>STANDARDIZED COEFFICIENTS</b>	<b>T</b>	<b>SIG.</b>
		<b>B</b>	<b>Std. Error</b>	<b>Beta</b>		
		<b>1</b>	(Constant)	2.384		
	Neurobiological Effects 1	-.156	.171	-.139	-.913	.366
	Neurobiological Effects 2	-.419	.175	-.351	-2.392	.021
	Neurobiological Effects 3	-.039	.172	-.034	-.225	.823
	Regular Physical Activity	.004	.173	.003	.024	.981

a. Dependent Variable: Cognitive Function 1

The above result of table 6 shows that linear regression analysis result represents the unstandardized coefficient values, included beta and standard error the result also presents that t statistic value and significant value of each independent variable. the neurobiological effects 1,2,3 shows that t statistic values are -0.913, -2.392 and -0.225 the significant value is 0.366, 0.021 and 0.823 shows that 36%, 2% and 82% significant level between them.

## 5. Conclusion

Recent studies demonstrated that a single session of physical activity improves the cognitive function and memory of the brain. Many other



researches also discovered that physical activity improves cognition abilities by following at least 20 minutes of physical activity. It is recommended by the Health and Human Service guidelines that elder people try physical activity to improve functions and its time depends on their fitness ability, and there is no time limit for them as they suffer from weakness in older age. It was also recommended that exercise for 150 minutes per week improves cognitive functions and reduces the risk of getting Alzheimer's disease by 40% in elder people. Some studies also demonstrated that implementing physical activity enhances the volume of the brain not just in the area of the hippocampus but also in the parts that execute and process the signal in the brain. For instance, the wheel running physical activity improves the dendrite spine ability and synapse number. In elderly persons, aerobic physical activity as compared to no-aerobic exercise improves the ability to self-attention tasks as the activation of the superior cortex and de-activation of the posterior cortex takes place. The research based on primary data analysis for determine the research used SPSS software and run result. Overall research concluded that significant analysis between them. According to studies a six-month aerobic exercise in elderly people improves the volume of brain and temporal cortex functions. According to some studies, it was demonstrated that aerobic physical activity at low intensity provides more beneficial effects as compared to high and moderate-intensity aerobic physical activity. Low intensity of aerobic exercise develops less stress in the body of elderly people. For instance, the thread mill exercises at low intensity for approximately 15 minutes increase the activation of BDNF growth factors. Yet, many studies verified that moderate to high-intensity aerobic exercise provides more benefits as compared to low intensity. This discussion is still under debate and more research is required to accomplish that topic.

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