AEROBIC EXERCISE AND BRAIN HEALTH

Words

Write the letter of each definition with the word it defines. If you don't know the definition, use the context of the reading passage to help you. Look for the words in bold as you read the passage.

PARAGRAPH 1

Words	Definitions
1 ..... aerobic	**A** adj., relating to energetic exercise
2 ..... mood	**B** n., the use of mental processes
3 ..... cognition	**C** n., a disease or illness
4 ..... disorder	**D** n., a feeling; a state of mind

PARAGRAPH 2

Words	Definitions
5 ..... stimulate	**E** n., a large amount of something in the same place
6 ..... regulate	**F** n., the loss of intellectual functioning of the brain
7 ..... rodent	**G** v., to control
8 ..... concentration	**H** n., the group of small animals that includes mice and rats
9 ..... dementia	**I** adj., of or relating to space
10 ..... spatial	**J** v., to cause a response

PARAGRAPH 3

Words	Definitions
11 ..... stave off	**K** n., total amount available
12 ..... gravity	**L** n., the process of becoming worse
13 ..... capacity	**M** n., seriousness
14 ..... deterioration	**N** v., to prevent for a period of time

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PARAGRAPHS 4–5

Words	Definitions
15 ..... diagnose	**O** v., to work against
16 ..... indicate	**P** adv., before
17 ..... counteract	**Q** v., to identify an illness
18 ..... link	**R** adj., damaged or weakened
19 ..... impaired	**S** v., to show
20 ..... previously	**T** n., connection

Reading

Aerobic Exercise and Brain Health

(1) The disease-fighting, weight-controlling benefits of physical exercise, especially **aerobic** exercise, have long been known. Now, researchers have discovered another advantage: Physical exercise has a powerful effect on brain health, and the benefits go beyond the release of endorphins, the chemical in the brain that improves **mood**. Exercise affects the brain's plasticity—that is, its ability to reorganize[1] itself—and can reduce the age-associated loss of brain tissue that decreases **cognition** in the elderly and in those who have **disorders** such as Alzheimer's disease.

(2) Recent studies have found that exercise activates a number of factors in the brain, including a protein known as *brain-derived neurotrophic factor* (BDNF), that **stimulate** the growth and development of brain cells. BDNF **regulates** the production of synapses, the connections between neurons that are essential for transmitting signals from one nerve cell to the next, and may also be involved in producing new nerve cells. Using **rodent** models, researchers found increased **concentrations** of BDNF in the hippocampus, an area of the brain involved in learning and memory and associated with **dementia**, after only one week of regular exercise. A study in older humans found a correlation between aerobic fitness, the size of the hippocampus, and performance on **spatial** memory tests. Other human studies noted that aerobic exercise increased the volume of gray[2] matter in some parts of the brain.

[1]BrE: reorganise
[2]BrE: grey

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(3) Regular exercise can help **stave off** some effects of normal aging and delay or diminish the **gravity** of conditions such as Alzheimer's disease, depression, and multiple sclerosis. Even over a relatively short time, exercise can repair some of the loss in brain **capacity** associated with aging. The greatest effects have been found in processes such as decision-making. Aerobic exercise can also improve short-term memory in the elderly. Exercise has been found to lower the risk of Alzheimer's disease in mice by decreasing the buildup of a protein known as beta-amyloid, which forms the brain plaques that precede Alzheimer's. The mice also outperformed non-exercising mice in a memory test. In a study of multiple sclerosis patients, those who exercised regularly fared better than those who exercised less. The exercise group scored better on tests of cognitive function, and their brain scans showed less **deterioration** and more gray matter.

(4) In addition to increasing brainpower, exercise can help relieve depression. Although it is well known that endorphins help relieve stress and reduce anxiety and depression, BDNF plays a role as well. Human studies have shown people who have been **diagnosed** with major depression typically have lower concentrations of BDNF in their blood. Animal studies **indicate** that corticosteroids, which the body produces in response to stress, decrease the availability of BDNF in the hippocampus. Exercise can **counteract** this effect. Exercise also lessens depression by increasing blood flow to the brain.

(5) The **link** between aerobic exercise and improved brain function in the elderly and in people with **impaired** cognition could lead to new ways to prevent and treat brain disorders. Meanwhile, people may have more control over their own brain health than was **previously** believed.

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Answer the questions about **Aerobic Exercise and Brain Health**.

Questions 1–8

Complete the sentences below.
Choose ***NO MORE THAN ONE WORD*** *from the text for each answer.*

1 Exercise helps people feel good mentally because it releases endorphins, which put people in a better ..... .

2 BDNF improves the connections between nerve cells in the brain because it ..... how those connections, or synapses, are made.

3 Studies on rodents showed that there were larger ..... of BDNF in the brain after just one week of exercise.

4 Exercise may lessen the ..... of Alzheimer's disease and other disorders that affect the brain.

5 As people age, they may not function as well because they lose some brain ....., but exercise can repair some of this lost ability.

6 A study with multiple sclerosis patients showed that those who exercised more had less ..... of the brain.

7 Usually, smaller amounts of BDNF are found in the blood of people ..... with depression.

8 Exercise may lessen the effects of stress because it can ..... the effects of corticosteroids, which are produced by stress.

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Word Families

A

Complete each sentence with the correct word from the word family chart. Make nouns plural where necessary. Use the correct form of verbs.

noun	noun	verb	adjective
diagnosis	diagnostician	diagnose	diagnostic

1 The doctor is an outstanding ..... .

2 Doctors use different ..... tests to identify diseases.

3 The doctor asks the patient a series of questions in order to make a ..... .

4 It is not always easy to ..... a disease.

noun	adjective	adverb
gravity	grave	gravely

5 The patient was ..... ill.

6 The patient arrived at the hospital in ..... condition.

7 Because of the ..... of her condition, the patient was kept in the hospital.

noun	noun	verb	adjective
indication	indicator	indicate	indicative

8 Forgetfulness may be an ..... that a patient is entering the early stages of dementia.

9 Studies ..... that exercise helps increase brain power.

10 Memory loss may be ..... of a more serious condition.

11 There are several key ..... that doctors look for in their diagnoses.

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noun	verb	adjective
impairment	impair	impaired

12 Multiple sclerosis patients suffer many physical ..... .

13 Aging can ..... short-term memory.

14 ..... memory can be improved by regular exercise.

noun	noun	adjective	adverb
mood	moodiness	moody	moodily

15 The patient replied ..... when asked if he was feeling much pain.

16 A person who suffers from ..... may be helped by regular exercise.

17 People are often in a good ..... after exercising.

18 If you are feeling ....., get some exercise.

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Word Families

B

Choose the correct word family member from the list below to complete each blank.

1	mood	moodiness	moody
2	indication	indicate	indicative
3	diagnosis	diagnose	diagnostic
4	gravity	grave	gravely
5	impairment	impair	impaired

If you are suffering from a bad **1**..... that won't go away, it is important to see a doctor. Mild depression may be a temporary response to the normal stresses of life, but ongoing depression could **2**..... a more serious condition. The doctor will ask you a series of questions and may recommend some tests to come up with a **3**..... . If your condition is **4**....., the doctor may give you medication. If, on the other hand, you are not suffering any serious disorder or **5**....., the doctor may recommend something as simple as regular exercise.

Paraphrases

Read the sentence from the reading passage. Then, choose the sentence that has the same meaning.

1 *Using rodent models, researchers found increased concentrations of BDNF in the hippocampus, an area of the brain involved in learning and memory and associated with dementia, after only one week of regular exercise.* (paragraph 2)

A Research with mice and rats showed that exercise raised levels of BDNF in a certain area of the brain.

B Researchers found that after exercise, mice and rats had increased intelligence.

C Mice and rats with higher levels of BDNF were able to learn exercise routines more quickly.

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2 *Regular exercise can help stave off some effects of normal aging and delay or diminish the gravity of conditions such as Alzheimer's disease, depression, and multiple sclerosis.* (paragraph 3)

A The ability to exercise regularly is affected by age and by certain serious conditions.

B The effects of exercise are less in the elderly and in those who suffer from certain conditions.

C Exercise may delay conditions of aging and the seriousness of certain medical disorders.

Dictionary Skill

DIFFERENT MEANINGS

Many words have more than one meaning.

Read the definitions below. Then read the sentences and write the letter of the correct definition for each sentence.

QUESTIONS 1–2

gra-vi-ty [GRA-vuh-tee]

A *noun.* seriousness

B *noun.* the force that holds objects on the Earth

..... **1** *Gravity* makes it easier to walk downhill than uphill.

..... **2** Because of the *gravity* of his injury, the doctor told him not to exercise for several months.

QUESTIONS 3–4

dis-or-der [dis-OR-der]

A *noun.* a disease or illness

B *noun.* confusion; lack of order

..... **3** The doctor's office was in such *disorder* that she couldn't find the test results.

..... **4** Depression is a serious *disorder*, but there are ways to treat it.

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Listening

Track 14

Listen to the conversation. Complete the form below.
*Write **NO MORE THAN ONE WORD** for each answer.*

Hospital Fitness Center[1]

New Patient Information

Patient Name: *Amanda* **1**.....

Interests: **2** ..... *exercise classes*

Level: *beginner, but previously took* **3**..... *classes*

Referral? *Yes, recommended by doctor in order to improve* **4**..... *and stave off* **5** ..... *gain.*

[1]BrE: Centre

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Writing (Task 1)

The charts[1] below show changes in mental capacity in patients who have been given a diagnosis of mild cognitive impairment, a condition that can develop into Alzheimer's disease or other types of dementia.

Summarize[2] the information by selecting and reporting the main information and making comparisons.

Write at least 150 words.

Group A (followed a program of 1 hour of aerobic exercise daily for 6 months)

Memory	Thinking Speed	Word Fluency
=	+	+

Group B (followed a program of 1 hour of nonaerobic [stretching and balancing] exercise daily for 6 months)

Memory	Thinking Speed	Word Fluency
–	–	–

Key:
– ..... deteriorated
= ..... no change
+ ..... improved

[1]BrE: tables
[2]BrE: summarise

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Speaking

Talk about the following topics.

Do you find that exercise improves your mood? What other things do you do to feel better when you are in a bad mood?

Now that researchers have found links between exercise and improved brain capacity, do you think exercising will become more popular? Why or why not?

What can be done to stimulate people to exercise more?

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