If you think that you are too busy to _____ time for exercising, _____ you don’t have time _____ because you don’t exercise. ___ ___ _____ that exercising is _____ ____ our physical health, ____ ___ ___ also necessary for maintaining and improving our _____ abilities and psychological conditions. A number of studies _____ _____ that people with regular exercise habits can enjoy greater performance and _____, have more _____ to stress, and _____ the risk ____ _____ illness. If you are _____ _____ work or study, you should actually _____ _____ ____ exercising to improve _____ _____. How is brain performance related to physical activities? Why is our body designed to function _____ _____ exercising? What kind of exercise is _____ to _____ ____ _____ benefits?

If you think that you are too busy to spare time for exercising, perhaps you don’t have time precisely because you don’t exercise. It is evident that exercising is important for our physical health, but it is also necessary for maintaining and improving our cognitive abilities and psychological conditions. A number of studies have shown that people with regular exercise habits can enjoy greater performance and concentration, have more resilience to stress, and reduce the risk of mental illness. If you are occupied with work or study, you should actually invest time in exercising to improve your efficiency. How is brain performance related to physical activities? Why is our body designed to function better with exercising? What kind of exercise is optimal to enjoy its cerebral benefits?

spare	割く、余分に使う		occupied	忙しい、専念している
evident	明らかな、はっきりした		efficiency	効率
cognitive	認知の、認識に関する		optimal	最適な
psychological	心理的な、精神的な		cerebral	脳の、大脳の
resilience	回復力、抵抗力			

Why We Should Exercise #2

Physical exercise makes us _____. In a study done in elementary schools in _____, researchers _____ academic performance of students who had PE lessons every day with those who had them only twice a week. Children with daily PE classes had higher _____ ____ the first language, mathematics, and the foreign language. Similar results _____ _____ _____ in studies conducted in the _____ ___ Illinois and Nebraska in the US. How does exercising contribute to _____ intellectual performance? Experiments using mice have shown that physical activity leads to _____ _____ of BDNF in the brain, particularly in the hippocampus. The hippocampus, _____ _____ the center of the brain, _____ a _____ _____ in the creation of new memories. BDNF _____ ____ brain-_____ neurotrophic factor, which supports the _____ and survival of _____, _____ the formation of synaptic connections, and _____ _____ the aging of cells. Put simply, BDNF is a _____ that helps grow memory related parts of the brain, and the best _____ way to increase it is physical exercise. Another study on _____ _____ has demonstrated that people who continued _____ ___ _____-_____ exercise for a year showed a 2 percent increase in _____ volume, _____ _____ ____ didn't exercise experienced a 1.4 percent decrease. The hippocampus typically _____ with aging, but regular exercise can _____ or _____ _____ ____. To gain this benefit, you need to perform _____ _____ _____ exercise, such as _____ walking, jogging, or swimming, for 30 to 40 minutes, two to three times per week. If you engage in a _____ intellectual work, you should make exercise a _____ precisely to maintain your cognitive performance.

Physical exercise makes us smarter. In a study done in elementary schools in Sweden, researchers compared academic performance of students who had PE lessons every day with those who had them only twice a week. Children with daily PE classes had higher scores in the first language, mathematics, and the foreign language. Similar results have been observed in studies conducted in the states of Illinois and Nebraska in the US. How does exercising contribute to enhanced intellectual performance? Experiments using mice have shown that physical activity leads to increased levels of BDNF in the brain, particularly in the hippocampus. The hippocampus, located near the center of the brain, plays a crucial role in the creation of new memories. BDNF stands for brain-derived neurotrophic factor, which supports the growth and survival of neurons, promotes the formation of synaptic connections, and helps delay the aging of cells. Put simply, BDNF is a molecule that helps grow memory related parts of the brain, and the best known way to increase it is physical exercise. Another study on human adults has demonstrated that people who continued moderate to high-intensity exercise for a year showed a 2 percent increase in hippocampal volume, while those who didn't exercise experienced a 1.4 percent decrease. The hippocampus typically shrinks with aging, but regular exercise can prevent or even reverse it. To gain this benefit, you need to perform moderately intense aerobic exercise, such as brisk walking, jogging, or swimming, for 30 to 40 minutes, two to three times per week. If you engage in a sedentary intellectual work, you should make exercise a habit precisely to maintain your cognitive performance.

academic	学問の、学業の		volume	容積、体積
intellectual	知的な、知性の		reverse	逆転させる、覆す
hippocampus	海馬		moderately	適度に、ほどよく
crucial	重大な、決定的な		aerobic	有酸素の
crucial	重大な、決定的な		sedentary	座りがちな、運動不足の
neurotrophic	神経栄養の			

Why We Should Exercise #3

Physical exercise _____ our concentration. This includes both an immediate benefit _____ _____ the exercise and a long-term _____ gained from regular continuous workout. The short-term benefit involves dopamine, which functions like _____ _____ within the brain's reward and attention systems. The brain can continuously direct its interest and attention to a _____ _____ _____ ____ _____ level of dopamine circulates through the relevant regions. _____ studies have shown that the level of dopamine increases after physical activities, ____ ___ _____ for a few hours. As a result, dopamine reaches the core regions of the reward system, making it easier to stay focused. As for the long-term benefit, regular exercising habits _____ _____ _____ to increase the _____ of the prefrontal cortex. This region works as a _____ of the _____ brain. ____ ____ responsible for directing attention exclusively to _____ information and exercising self-control for long-term goals rather than _____ _____. When you are _____ _____ _____ tasks, the prefrontal cortex helps you prioritize them and focus on each task one by one. When you are _____ by a _____ from your phone _____ studying, this region judges whether to _____ ____ ____ _____ ____. This _____ part of the brain is enhanced by a regular exercising habit. The reason why exercise ____-_____ our attention _____ in the hunter-gatherer lifestyle of our ancestors. _____ ____ was running _____ _____ or collecting nuts in a dangerous wood, ____ _____ physical activities ____ _____ their survival depended. When our ancestors _____ ___ choose the right target of their attention while moving, ____ _____ _____ _____. Therefore, the brain has _____ to optimize its focus _____ intense physical activities.

Physical exercise enhances our concentration. This includes both an immediate benefit right after the exercise and a long-term reward gained from regular continuous workout. The short-term benefit involves dopamine, which functions like internal currency within the brain's reward and attention systems. The brain can continuously direct its interest and attention to a certain object when an appropriate level of dopamine circulates through the relevant regions. Several studies have shown that the level of dopamine increases after physical activities, and it continues for a few hours. As a result, dopamine reaches the core regions of the reward system, making it easier to stay focused. As for the long-term benefit, regular exercising habits have been shown to increase the volume of the prefrontal cortex. This region works as a supervisor of the whole brain. It is responsible for directing attention exclusively to relevant information and exercising self-control for long-term goals rather than immediate impulses. When you are overwhelmed with numerous tasks, the prefrontal cortex helps you prioritize them and focus on each task one by one. When you are distracted by a notification from your phone while studying, this region judges whether to react to or ignore it. This critical part of the brain is enhanced by a regular exercising habit. The reason why exercise fine-tunes our attention lies in the hunter-gatherer lifestyle of our ancestors. Whether it was running after prey or collecting nuts in a dangerous wood, it involved physical activities on which their survival depended. When our ancestors failed to choose the right target of their attention while moving, it meant their death. Therefore, the brain has evolved to optimize its focus during intense physical activities.

concentration	集中力		notification	通知、知らせ
dopamine	ドーパミン		distraction	気を散らすもの、注意散漫
reward	報酬、喜び		fine-tune	微調整する、調整する
impulse	衝動		ancestor	祖先
overwhelmed	圧倒された、手に負えない		prey	獲物
prioritize	優先順位をつける			

Why We Should Exercise #4

Physical exercise improves _____ _____ to deal with stress. To understand this benefit, we need to know about a hormone _____ cortisol. One of the major _____ of this hormone is to raise the _____ ____ and _____ _____ in response to stress _____. Due to the increased _____, the brain and muscles can receive a lot of energy and oxygen and better deal with the _____ _____ _____ the stress response. Cortisol is essential for our survival, _____ ____ _____ _____ some _____. Firstly, excessive or chronic increase in cortisol can lead to various harms, including _____ damage, _____ activity of _____ _____, and _____ _____ function. Secondly, the cortisol system responds not only to physical threats but also to psychological ones—especially those related to human relationships, _____ ____ a _____ _____ of chronic cortisol _____. The good news is that regular exercise is very effective to optimize the cortisol system. Physical _____ ____ exercising is also a form of stress, _____ ___ ___ _____-_____ and beneficial to health. If you experience an increased heart rate and blood pressure on a daily basis _____ exercising, such stress responses are _____ _____ for your system. Your body becomes accustomed to stress responses, _____ _____ overreactions and recovering quickly to a _____ _____. Furthermore, regular exercise reduces the _____ ____ cortisol for the same level of stress. _____ exercise _____ the _____, _____, and _____ systems, improving their efficiency and _____ reducing the amount of energy and oxygen needed to produce the _____ _____. In other words, those who exercise can perform well with less cortisol. For example, those who don't _____ ____ ___ _____ _____ _____ up a _____ require less cortisol than those who become _____, and the former are likely to show lower levels of cortisol for social stressors as well. Physical exercise _____ ____ training to minimize the _____ of the stress hormone.

Physical exercise improves our ability to deal with stress. To understand this benefit, we need to know about a hormone called cortisol. One of the major roles of this hormone is to raise the heart rate and blood pressure in response to stress stimuli. Due to the increased bloodstream, the brain and muscles can receive a lot of energy and oxygen and better deal with the threat that prompted the stress response. Cortisol is essential for our survival, but it also has some problems. Firstly, excessive or chronic increase in cortisol can lead to various harms, including neural damage, impaired activity of prefrontal cortex, and declined immune function. Secondly, the cortisol system responds not only to physical threats but also to psychological ones—especially those related to human relationships, which are a common cause of chronic cortisol exposure. The good news is that regular exercise is very effective to optimize the cortisol system. Physical strain in exercising is also a form of stress, but it is short-term and beneficial to health. If you experience an increased heart rate and blood pressure on a daily basis through exercising, such stress responses are not unusual for your system. Your body becomes accustomed to stress responses, refraining from overreactions and recovering quickly to a normal state. Furthermore, regular exercise reduces the amount of cortisol for the same level of stress. Habitual exercise strengthens the respiratory, circulatory, and muscular systems, improving their efficiency and thereby reducing the amount of energy and oxygen needed to produce the same output. In other words, those who exercise can perform well with less cortisol. For example, those who don't get out of breath when climbing up a staircase require less cortisol than those who become winded, and the former are likely to show lower levels of cortisol for social stressors as well. Physical exercise serves as training to minimize the secretion of the stress hormone.

cortisol	コルチゾール		strain	負担、緊張
stimulus	刺激		accustomed	慣れた、習慣的な
prompt	引き起こす、促す		refrain	控える、差し控える
chronic	慢性的な、長期的な		secretion	分泌
impair	損なう、弱める		respiratory	呼吸の
exposure	暴露、さらされること		circulatory	循環の

Why We Should Exercise #5

The brain has _____ ____ movements. Among the _____ number of species, only those who move possess a brain. Plant species don't have brains because they don't move. This _____ _____ _____ 600 million years ago to _____ the surrounding environment and effectively _____ it. _____ _____ and _____ _____ involve highly complicated information processing. _____ ____ _____ hunter-gatherers ran through the forest by _____ roots and branches, estimated the _____ ___ _____, and _____ a _____ with the right _____ and _____, their brain had to process incredibly complex and _____ cognitive work. The brain has to recognize the changing environment through the _____ _____, _____ _____ the precise position of each body part in the perceived space, and _____ _____ _____ movements of the whole body. We can also understand the complexity of motor control by looking at the development of _____ _____ in the last several decades. In 1997, computers had already _____ human beings in the "intellectual" activity of _____ ____ the best move ____ ____ _____ ____ chess. However, it was only around 2020 when robots became capable of a _____ simple task of _____ ____ a chess _____ and moving ___ ___ _____ _____. The brain has evolved not for work or study but for movements. All of our intellectual activities—_____, language, data analysis, ____ ___ _____—are _____ _____ uses of the brain that developed for physical action. Running in the park _____ far more complex cognitive activities in a far larger part of the brain than _____ a crossword puzzle ___ ___ _____. It is no wonder that exercising is effective for the development and maintenance of our cognitive _____. For _____ _____ haven't had any connections with exercise, even a 30-minute walk a day can be a good way to start. If you want to _____ your brain's performance ___ work or study, the _____ thing you should do is to ____ _____ 30 minutes of exercise to spend 30 more minutes ___ your desk.

The brain has evolved for movements. Among the vast number of species, only those who move possess a brain. Plant species don't have brains because they don't move. This intricate organ emerged 600 million years ago to perceive the surrounding environment and effectively navigate it. Spatial recognition and motor control involve highly complicated information processing. When our ancestral hunter-gatherers ran through the forest by dodging roots and branches, estimated the distance to prey, and threw a spear with the right angle and force, their brain had to process incredibly complex and delicate cognitive work. The brain has to recognize the changing environment through the five senses, constantly update the precise position of each body part in the perceived space, and delicately coordinate muscular movements of the whole body. We can also understand the complexity of motor control by looking at the development of artificial intelligence in the last several decades. In 1997, computers had already outperformed human beings in the "intellectual" activity of figuring out the best move in the game of chess. However, it was only around 2020 when robots became capable of a seemingly simple task of picking up a chess piece and moving it to another square. The brain has evolved not for work or study but for movements. All of our intellectual activities—computation, language, data analysis, and so forth—are merely secondary uses of the brain that developed for physical action. Running in the park requires far more complex cognitive activities in a far larger part of the brain than solving a crossword puzzle in a chair. It is no wonder that exercising is effective for the development and maintenance of our cognitive capacities. For those who haven't had any connections with exercise, even a 30-minute walk a day can be a good way to start. If you want to improve your brain's performance at work or study, the last thing you should do is to cut out 30 minutes of exercise to spend 30 more minutes at your desk.

intricate	複雑な、入り組んだ		outperform	より優れる、上回る
navigate	操作する、進路を決める		secondary	二次的な、副次的な
spatial	空間の、空間的な		capacity	能力、才能
recognition	認識、認知		cut out	削る、省く
coordinate	調整する、協調させる			