

LOYOLA ACADEMY

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Excerpt from Spark, The Revolutionary Science of Exercise and the Brain

CHAPTER 1

The first chapter discusses the benefits of exercise using Naperville Central High School as a case study. Within this school, they have a program known as Zero Hour PE in which students participate in cardiovascular activities before school in order to increase their ability to focus and perform in school. Through a series of studies and tests, it has been found that students who participate in exercise before class outperform students who did not participate in exercise before class. Engaging in as little as 30 minutes of cardiovascular activity, students were demonstrating markedly improved academic achievement.

CHAPTER 2

Chapter two discusses in depth how the brain works. Elements such as neurons, neurotransmitters, the cerebellum, frontal cortex, hippocampus, and the many different chemicals that assist brain function are described and explained. Ratey, through scientific evidence and discussion, proves how exercise greatly increases the abundance of cell growth within the brain, as well as elevating the levels of important hormones and chemicals that allow neurons to transmit their messages with greater speed and efficacy. Ratey argues that movement (particularly cardiovascular exercise) is an essential factor in human development and health, thus regular exercise allows our brains and bodies to continuously grow, heal, and become stronger.

CHAPTER 3

Chapter three focuses upon stress: the definition, the causes and effects, the ways in which stress can be alleviated. Ratey defines stress as “a threat to the body’s equilibrium. The feeling of stress is essentially an emotional echo of the underlying stress on your brain cells” (59). As is expected, Ratey argues that stress can be alleviated by exercise. The brain activity caused by exercise generates molecular by-products that can damage cells, but under normal circumstances, repair mechanisms leave cells stronger for future challenges. Neurons are broken down and built up just like muscles—stressing them makes them more resilient. This is how exercise forces the body and mind to adapt. Because exercise stimulates the recovery process in our muscles and neurons, it leaves our bodies stronger and more resilient.

CHAPTER 4

Chapter four dissects the elements of anxiety. Anxiety is a natural reaction to a threat that happens at a certain point in the stress response, when the sympathetic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis shift into high gear. The physical symptoms range from feeling tense, jittery, and short of breath to experiencing a racing heart, sweating, and, in the case of full-blown panic attacks, severe chest pains. Anxiety can be a disabling factor in many individual's lives. Anxiety can ruin sleep patterns; disallow workplace functionality, and a host of other issues. While drugs are the current prescription for anxiety, Ramey naturally cites evidence for the benefits of exercise rather than medication. Exercise provides distraction, reduces muscle tension, builds brain resources, teaches a different outcome, reroutes brain circuitry, improves resilience, and ultimately sets you and your brain free from anxiety.

CHAPTER 5

About 17 percent of American adults experience clinical depression at some point in their lives. Many of these individuals are so ill that they commit suicide. Currently within the United States, someone commits suicide every seventeen minutes. Depression is an epidemic of gross proportions, one that unfortunately remains largely misunderstood. However, it is known that depression is caused by a chemical imbalance within the brain, disallowing the proper transmittal of information between neurons. Interestingly enough, it has been largely through depression research that doctors have discovered the effects of exercise and the brain. Just as exercise assists in the management of stress and anxiety, exercise effectively assists in the management of depression. A Finnish study of 3,403 people in 1999 showed that those who exercise at least two to three times a week experience significantly less depression, anger, stress, and "cynical distrust" than those who exercise less or not at all. These findings have been discovered repeatedly in studies that are more modern.

CHAPTER 6

ADHD is another area in which exercise can be incredibly beneficial. ADHD stems from a malfunction of the brain's attention system, a diffuse linkage of neurons that hitches together areas controlling arousal, motivation, reward, executive function, and movement. The most effective means of treating and managing ADHD is to supply dopamine and norepinephrine to the brain, both of which are amply supplied by exercise. These neurotransmitters flood the brain, especially the attention system, which is where individuals with ADHD have problems. By encouraging individuals with ADHD to engage in exercise every morning before they go to work or school, they are much more, likely to be able to focus, produce quality work, and remain engaged throughout the entirety of the day.

CHAPTER 7

Chapter seven proposes a revolutionary new idea: exercise can combat addiction. Whether it is addiction to drugs or alcohol, exercise can help. Exercise works from the top down in the brain, forcing addicts to adapt to a new stimulus and thereby allowing them to learn and appreciate

alternative and healthy lifestyles. While exercise may not provide the instantaneous rush of morphine or swig of vodka, it instills a more diffuse sense of well-being that, over time, will become a craving in its own right. For example, a study in London found that even ten minutes of exercise could blunt an alcoholic's craving. Exercise dramatically reduces the withdrawal symptoms that are associated with addiction, thus its immense influence. Some argue that if exercise acts as a replacement for addiction, then it must be an addiction itself. Ratey explains that for some individuals, that may be the case. However, those who are addicted to exercise are generally women with a body dysmorphic syndrome-those that are obsessed with body image. In short, those who become addicted to exercise are usually those with prior-existing obsessive behaviors.

CHAPTER 8

Chapter eight was by far my favorite chapter, primarily because it discussed female hormonal fluctuations and the ways in which exercise can calm those fluctuations. Perhaps the most well-known and widely discussed female hormone fluctuation is PMS. Other hormone fluctuations that can dramatically alter a female's behavior include pregnancy and menopause. It is interesting to note that scientists do not know precisely what causes PMS, but changes in hormone levels are the most likely culprit. During menstruation, hormone levels can spike up to 50 times their normal level, producing symptoms ranging from the minor to severe. Exercise (of course) can alleviate and reduce negative symptoms associated with PMS. Exercise restores the balance between the opposing forces of activity in the brain during a time that is tumultuous for some women. It also fine-tunes the hypothalamic-pituitary-adrenal (HPA) axis, which improves the ability to cope with stress.

CHAPTER 9

Chapter nine discusses the effects and symptoms of aging. As with almost everything else, exercise staves off the negative side effects associated with aging. By conducting regular exercise throughout one's life, they can expect an easier aging process as well as a longer life. Ratey outlines numerous benefits of exercise in regards to aging: Exercise strengthens the cardiovascular system, regulates the body's fuel, reduces obesity, elevates your stress threshold, lifts your mood, boosts the immune system, fortifies your bones (a major concern for aging women), boosts motivation, and fosters neuroplasticity. In essence, exercise provides every necessary supplement needed for graceful and relatively pain-free aging.

CHAPTER 10

The concluding chapter of this book combines all the elements presented within early chapters and brings them together to illustrate the absolute importance and necessity of incorporating exercise into our everyday lives. Ratey emphasizes that above all else, it is essential for humans to exercise because it builds and repairs our brains. Given that our brains are running the show, it makes little sense not to encourage its growth and connective expansion. The purpose of exercise

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is not to look fabulous in that tiny bikini. The purpose of exercise is to balance the chemicals within our brains and bodies to ensure us of a more positive, calm, and meaningful existence.

