EXERCISE AND THE MIND

Can exercise really elevate your mood? Will it actually lower depression and anxiety? The latest research—and there is a lot of it—has come forth with some very concrete answers.

By David C. Nieman, DHSc, MPH, FACSM

“My body must be set a-going if my mind is going to work.”—Jean Jacques Rousseau

Donna felt depressed. She had just received a low C grade on her first biochemistry test, and as a freshman medical student, she was extremely worried about her chances of staying in the program. After pulling on her jacket, she went out for a 40-minute brisk walk on the hilly roads near her school. By the time Donna returned to her dorm room, her spirits were lifted, her depression was gone, and she sat down at her desk with a renewed determination to keep pressing on with her studies.

Mary came home feeling tense, anxious, and irritable. She was a manager for a large business firm and had spent all day unsuccessfully trying to mend sharp differences between two of her key department heads. After fighting traffic for 45 minutes on the way home, she felt she needed to clear her mind. In her well-worn jogging shoes, Mary went out for a 30-minute jog on the dirt trails behind her house, and by the time she returned home, she felt completely different. Her mind felt relaxed, her mood was elevated, and all her built-up tension was erased.

Is this fact or fancy? Is it really true that exercise can help alleviate mental anxiety, depression, and other problems? Does the motion of the body influence the psychological health of the mind?

**Mind and Body**

For a long time researchers have known that psychological states can have a profound effect on one’s physical health. Denial, depression, inflexibility, conformity, lack of social ties, hostility, high levels of anxiety and dissatisfaction, repressed feelings of loss, and many life-changing events have, in major studies, been associated with increased risk of infection, cancer, and heart disease.

National surveys have shown that nearly one-half of adults in the United States experience at least a moderate amount of stress during any given two-week period. Nineteen percent of the population (nearly 30 million Americans) are affected by one or more mental disorders, especially anxiety and depression.

**Body and Mind**

Poor psychological health, then, is associated with poor physical health. But is the opposite true? Is a healthy and fit body related to psychological health? Were the ancient Greeks right in their assertion that a physically fit and strong body would lead to a sound mind?

The part of the brain that enables us to exercise—the motor cortex—lies only a few millimeters away from the part of the brain strata that deals with thought and feeling. Might their proximity mean that when exercise stimulates the motor cortex, it has a parallel effect on cognition and emotion?

For centuries, many have believed in the “cerebral satisfaction” of exercise. The Greeks maintained that exercise made their minds more lucid. Aristotle started his Peripatetic School in 335 B.C. The school was so named because of Aristotle’s habit of walking up and down (peripatein) the paths of the Lyceum in Athens, while thinking or lecturing to his students who walked with him.
Oliver Wendell Holmes, many years later, explained that, "In walking, the will and the muscles are so accustomed to working together—and perform their task with so little expenditure of force—that the intellect is left comparatively free."

The highly acclaimed Perrier Survey of Fitness in America, conducted by Louis Harris and associates, shows that modern-day men and women strongly believe in the Greek concept of a "strong mind in a strong body." The survey found that those who have a deep commitment to exercise reported feeling more relaxed, less tired, and more disciplined. They also reported having greater self-confidence, greater productivity in work and, in general, a stronger sense of being at one with themselves.

In my study of 2,300 Los Angeles marathon runners who had been running an average of seven years, over 90 percent reported that energy levels were higher, stress was handled better, and sleep was improved compared to their pre-running years.

EXCITING NEW STUDIES

Well over 1,000 studies have been conducted investigating whether or not exercise really results in measurable improvements in depression, anxiety, intelligence, self-concept, and other psychological parameters. Exciting new data is supporting this conclusion.

Recently, Dr. Tom Stephens of Canada directed the evaluation of data from four national surveys in the US and Canada. "The inescapable conclusion," says Stephens, "is that physical activity is positively associated with good mental health, especially positive mood, general well-being, and less anxiety and depression." This relationship was found to be stronger for the older age group (40-plus years of age) than for the younger, and for women rather than men. These findings were supported recently in a study of 400 adults in Illinois. Increased participation in exercise and sports was associated with decreased symptoms of depression, anxiety, and fatigue. This was the first community survey using a large, representative sample to examine this relationship.

During the past 25 years, a large number of studies have shown that life events of all types (marriage, divorce, buying a house, losing one's job, moving to a new location, surgery for health problems, etc.) are significant stressors, leading to predictable physical and psychological health problems. Several recent studies have shown, however, that such life stress has less negative impact on the health of physically active individuals.

In a four-year study of 278 managers from 12 different corporations, for example, it was found that corporate managers who were active experienced less health problems from the stress they experienced than inactive managers. Because it is not always practical or even possible to avoid many stressful life events, regular aerobic exercise may be one way to reduce the impact of stress on health.

Many other studies have shown the value of physical activity for improved psychological health. Researchers at Duke University showed that after 10 weeks of walking and jogging 135 minutes a week, exercising adults showed decreased anxiety, depression, and fatigue, with elevated vigor. Dr. Carlyle Fikins of the University of California at Davis has shown that regular exercise by policemen and firemen is associated with decreased anxiety and depression.

Dr. John Griest of the University of Wisconsin compared the effects of a running program against psychotherapy with depressed subjects. Running was found to be at least as effective as psychotherapy in alleviating moderate depression. Dr. George McGlynn of the University of San Francisco showed that 14 weeks of jogging about eight miles per week significantly decreased anxiety in a group of adults compared with a similar non-exercising group.

Results from some studies suggest that short-term memory and intellectual function may be improved during or shortly after an exercise session. In one study, subjects exercising moderately on a
stationary bicycle demonstrated an increase in short-term memory, comprehension, and ability to react mentally during exercise. More research is needed to study the impact of regular physical exercise on mental cognition during non-exercise periods.

**How And Why Does It Work?**

How and why exercise improves psychological health is still unresolved. Some of the theories center on various hormones and other body chemicals. The body has an amazing, recently discovered hormonal system of morphinelike chemicals called "endogenous opioids" whose receptors are found in the area of the brain associated with emotion, pleasure, pain, and behavior. During exercise, the pituitary increases its production of B-endorphin, one of the endogenous opioids, increasing its concentration in the blood.

Although widely accepted by the exercising public that endorphins are responsible for exercise-induced euphoria, convincing scientific evidence is largely absent. Most researchers have found that the increase in B-endorphin is unrelated to the improvement in mood following exercise. Before any molecule from the blood can enter the brain cells, it must pass through a highly selective barrier made up of special tissues. Most researchers have been unable to demonstrate that after the pituitary secretes endorphins into the blood, they are able to gain entry into the brain.

Other theories appear to be more important. Exercise may enhance the activity of special chemicals in the brain called neurotransmitters. Dr. Charles Ransford of Hillsdale College in Michigan has reviewed the data in this area, and although much more study is needed, he speculates that exercise may alter levels of norepinephrine, dopamine, and serotonin in the brain, decreasing depression.

Dr. James Wise of Alberta Hospital and a research team at Arizona State University have both discovered that during exercise, there is an increase in brain emission of alpha waves. These brain waves are associated with a relaxed meditation-like state, appear 20 minutes into a 30-minute jog, and are still measurable after the exercise is over. Researchers speculate that the increased alpha wave power could contribute to the psychological benefits of exercise, including reductions in anxiety and depression.

Other researchers suggest that exercise decreases muscle electrical tension. Some advance the idea that exercise increases oxygen transport to the brain. Another theory is that the rise in deep body temperature that exercise causes may influence certain brain neurotransmitters.

Whatever the real reasons for the positive impact of exercise on the brain—increased B-endorphin, increase in brain alpha power, or enhanced brain neurotransmission—the preliminary evidence is very compelling and more research will help us to better understand why we feel so good after exercise.

**How Much Do I Need To Exercise?**

One of the amazing facts to come out of recent research is that the same amount of exercise that helps the heart also helps the brain. The American College of Sports Medicine has established that 20- to 45-minute exercise sessions three to five times per week of moderate-intensity aerobic activity, like jogging, swimming, bicycling, aerobics, or brisk walking is necessary to develop the heart-lung blood-vessel system. Most of the studies quoted in this article used the same exercise criteria showing that as the heart is strengthened, so is the brain.

The mental benefits come very quickly in response to regular exercise. In one study that I conducted on 40 women, just six weeks of walking three miles five times a week led to dramatic improvements in vigor and general well-being, compared with a sedentary control group.

More research is needed to evaluate the effect of regular exercise on overall mental function. The decrease in anxiety and depression and the elevation in mood that come with regular exercise should help brain workers at least feel better during their work. What this means for busy students and workers everywhere is that time spent in exercise may not be lost. Instead, the half-hour exercise session could mean enhanced mental functioning and greater time efficiency. Including exercise breaks for normally sedentary office workers or students may actually enhance productivity of work and study.

In essence, this article merely points out what we already strongly suspected, and what individuals like Donna and Mary have experienced. Exercise is good for both the body and the brain. Through regular, active use of the body, one can discover a greater sense of well-being, far greater vitality, and a calmer, more relaxed attitude toward daily pressures.

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