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RESEARCH

Risks of overtraining and compulsive exercising on human health

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David Miranda, a physical therapist and the proprietor of Excel Rehabilitation Services in Gonzales, Louisiana, asserts that excessive exercise is harmful to human health and counterproductive. Women who exercise excessively run a higher risk of developing the "female athlete triad," which includes eating disorders, osteoporosis, and loss of bone mineral density. Intense exercise has been shown to lower libido in men; this may be due to physical exhaustion and low testosterone levels. According to German research that was recently published online in the journal *Heart*, excessive high-intensity exercise may actually increase the risk of dying from a heart attack or stroke in people who already have heart disease. Too much exercise without adequate recovery might cause low testosterone levels and high amounts of the stress hormone cortisol. Overtraining can increase stress hormone levels, and increase the risk of injury, weariness, and muscle loss. *The Wall Street Journal's* article "A Workout Ate My Marriage," which was published in 2010, describes how spouses grow more estranged from one another as they become fixated on a particular exercise goal, such as extreme weight loss or an Ironman triathlon, at the expense of quality time with loved ones.

Keywords: compulsive exercising, human health, overtraining, risks

Introduction

Over-exercising occurs in people who go from not exercising at all to aggressively trying to lose weight or get in shape. Overtraining increases the risk of overuse injuries such as tendinitis and stress fractures in both men and women. Physical activity helps strengthen the immune system and stave off disease, but if done excessively, it can also make people sicker more frequently.

Doctors advise 150 min of physical activity per week for human health, but even in that amount of time, a healthy person might push themselves too far. Exercise improves many different aspects of health, including those related to the heart, bones, weight, mood, and emotions. In order to understand the negative effects of excessive exercise, people should learn how it makes them feel physically and emotionally ill (1).

After all, professional athletes will work out for hours each week. Exhaustion, ongoing exhaustion, irritation, persistent soreness of the muscles, and fitness plateaus are all indicators that you are working out too hard. According to physical therapist and proprietor of Excel Rehabilitation Services in Gonzales, Louisiana, David Miranda, "over-exercising is unproductive and can really be dangerous to human health" (2).

The effects of excessive exercise on mood and energy are significant. According to National Academy of Sports Medicine (NASM), the fatigue and low energy associated with excessive exercise can lead to irritability, anger, sleep issues, issues at work or school, and a lack of enjoyment of people's typical interests and hobbies (3). Overtraining and excessive exercise have a number of negative effects on human health, including:

Increase in resting heart rate

Under conditions of excessive stress, the heart beats more quickly, increasing the resting heart rate. People will be informed of any changes by monitoring the human heart

rate in the morning. Any increase from the average rate for a person could indicate that their body is overworked (4). Regular exercise should lower a person's resting heart rate, according to the NASM, but overtraining can have the opposite impact. An elevated heart rate while at rest could indicate a serious problem or a change in the cardiovascular system (5). Athletes' resting heart rates increase when they overtrain. When people exercise, they can typically anticipate a decrease in their resting heart rates, so when they notice an increase, it might be problematic.

Missing periods

Women who overtrain may begin missing their periods, a condition known as amenorrhea, which is brought on by a drop in estrogen levels and can potentially induce osteoporosis (6). With frequent overtraining, women may stop menstruating or develop early-onset osteoporosis (7). The "female athlete trifecta," which involves eating disorders, osteoporosis, and loss of bone mineral density, puts women at special risk. These symptoms typically result from a combination of excessive exercise and calorie restriction, which results in a mismatch between the amount of energy consumed and the amount of energy used, leading to what is known as low energy availability; it is not always necessary to burn a lot of calories. The hormones in women's bodies that regulate their menstrual cycle can fluctuate as a result of vigorous exercise. Women who have it may experience breakthrough bleeding while not in menstruation, lighter periods than usual, and occasionally no periods at all (8).

Decrease libido

On the other side, men might feel less sex-driven as a result. Intense exercise has been shown to diminish libido in men, presumably as a result of physical exhaustion and low testosterone levels (9). The testosterone levels of elite athletes can fall, which is a sign that they are damaging their bodies. According to Schroeder, these people frequently exhibit low testosterone and elevated cortisol, a stress hormone. After just 2 weeks, overtraining can lead to sleep disturbances, erectile dysfunction, and hypertension, in addition to a reduction in athletic ability.

Joint problems or bone and muscle injuries

Joint problems are typically caused by overtraining with excessively heavy weights performed too frequently. Even athletes need days off, according to the Mayo Clinic, because running too far too frequently, lifting too much weight, or just pushing oneself too hard can cause stress fractures, shin splints, and muscle strains (10). According to Northwestern Medicine (11), people can also increase their chance of suffering from problems such as stress fractures, muscular strains, runner's knee, joint soreness, tendonitis, and bursitis. Athletes run the danger of developing overuse ailments such as tendinitis, weariness, or tendon rips when the body isn't given time to recuperate, according to Slabaugh. According to him, it also raises the chance of further injuries. Muscle pain has been attributed to lactic acid buildup, but the real culprits are lactate, certain acids, and adenosine triphosphate (ATP). Researchers at the University of Utah discovered that these chemicals are released during muscle contraction, resulting in discomfort and pain (12). People who don't give their muscles enough time to recover experience persistent soreness, which can seriously interfere with their daily activities in addition to making them feel bad (13).

Heart problems

According to German research that was just published online in the journal *Heart*, excessive high-intensity exercise may actually increase the chance of dying from a heart attack or stroke in people who already have heart disease. Another Swedish study found that those who engage in endurance training more than five times per week run the risk of developing an irregular heartbeat as they age (14). "It's important to consider that there are other dangerous effects of over-exercising, such as rhabdomyolysis, which can occur when people work out too much," Olufade says, adding that this is true of both the quantity and quality of the workouts. The Centers for Disease Control and Prevention (CDC) describe rhabdomyolysis as a serious (and potentially fatal) medical condition in which electrolytes and proteins from injured muscle tissue leak into the blood, harming the heart and kidneys (15). Heart damage and irregular heartbeats can occur under extreme circumstances. Cardiovascular issues from overtraining are especially likely in people with genetic risk factors (16). Years of intense exercise or lifelong endurance training can wear down the heart muscles, making people more susceptible to a disease called "ventricular arrhythmia," in which the heart beats erratically. This has literally ended the careers of some professional endurance athletes who participate in the type of training required for this problem to emerge (17). This is most likely due to injury to the right chamber of the heart, which can alter normal heart rate and rhythm. Overtraining causes increased cardiovascular stress, making even easy workouts challenging. Particularly, people who engage in overtraining exercise experience an increase in their baseline heart rate, and it might be challenging for the heart rate to return to normal after exercising, necessitating longer durations of rest (18).

Dark or reddish urine

Following exercise, those who observe color changes in their urine may be experiencing rhabdomyolysis, a condition where toxins from damaged muscle tissue leak into the circulation. Kidney issues could result from this (19). Athletes appear to be more at risk from weight-bearing, strenuous activities than from other, less weight-bearing forms of exercise. Any one of these elements, by themselves or in any combination, may lead to hematuria. Traumatic hematuria may result from any direct injury to the kidneys, bladder, or urethra and may be linked to injuries to the bladder, dehydration, or the deterioration of red blood cells that results after prolonged aerobic exercise.

Poor mental health such as depression and anxiety

According to research in the journal *Preventative Medicine*, persons who exercise more than 7.5 h per week may be more vulnerable to mental health problems including anxiety and despair. Additionally, disorientation, irritation, aggression, and mood changes may result from an overstressed body (20). They may become exhausted and even unhappy from overexertion. They might feel even more worn out because it may interfere with their sleep and eating. People may try to change their fitness regimen by dropping their intensity or even switching the type of exercise they undertake if their exercises don't leave them feeling energized. Even so, some people might try to increase their intake of protein and wholesome carbohydrates (21). While moderate exercise can help people unwind and provide a night of blissful sleep, excessive exercise can cause agitation and disrupt sleep, causing a person to toss and turn all night. According to a study published in December 2015 in the *Journal of Behavioral Addictions* (22), there is evidence that long-term over-exercising can contribute to or exacerbate mental health conditions such as depression, obsessive-compulsive disorders, and anxiety. Low testosterone levels and high levels of the stress hormone cortisol can result from excessive exercise without enough time for recovery.

Drop in energy

Researchers concentrated on the involvement of lactic acid and ATP, two muscle metabolites, in overtraining. People may need to take a break if they haven't been experiencing the usual high after working out or if they are consistently physically and emotionally drained. The researchers found that during exercise, muscles create metabolites that are detected by metaboreceptors that send information to the brain via fatigue pathways. Most people feel fatigued and need to quit after vigorous exercise, but they quickly bounce back. However, some people weary far more quickly, and occasionally they are completely spent only after crossing a room.

Poor social relationships

Exercise can harm a person's relationships with friends and family if it becomes compulsive. Others may be exercising too much or for the wrong reasons, if according to the National Eating Disorders Association, they start to decline or cancel plans with people they enjoy exercising with (23). People who feel anxious or guilty after skipping a workout may have an obsession with exercise. According to Miranda (24), forgoing or avoiding social activities in favor of working out typically indicates a need for or an unhealthy work-life balance. Exercise with a friend or in a group environment passes the time more quickly, encourages experimentation, and adds variety because everyone involved has different abilities and knowledge. Exercise junkies could skip class or time with friends and family in order to exercise. Pressure to perform, low self-esteem, and a lack of other interests all exacerbate emotional problems.

Decreased performance

People are pushing their bodies too hard if they experience a decline in performance while exercising, especially while performing aerobic workouts such as cycling, swimming, and running. Regardless of increased training volume or intensity, decreasing athletic performance is one of the primary symptoms of overtraining. This drop in performance can be attributed to decreasing strength/endurance, longer reaction times, slower running speeds, and diminished agility. In addition, overtraining may result in motivational loss. Impairment in performance during training and competition is linked to sympathetic or parasympathetic nervous system dysfunction and sensitivity to stress hormones; this shows that persistent fatigue can have an impact on both the body and the mind. Overtraining may result in a plateau or a decline in performance rather than an improvement. Humans may discover that they are less strong, agile, and resilient than other animals, which makes it harder for them to achieve their training objectives and also slows down their reaction time and running speed.

Low weight or body fat percentage

Humans can maintain a healthy weight through exercise. However, some side effects of excessive exercise can result in excessive weight loss. Women should typically have a body mass index (BMI) of over 18.5 and a body fat percentage of

over 20%. Their hormones may start to change if their weight drops too low. Women who are underweight are more likely to experience early menopause, osteoporosis, and infertility. Anemia and a weakened immune system are additional risks.

Hormonal dysfunction

Cortisol and epinephrine, two stress hormones, are adversely affected by overtraining. This hormone imbalance can cause emotional lability, difficulties focusing, irritability, sadness, and sleep problems (25). Excessive exercise can actually have the reverse effect on a person's hormones, producing too much cortisol and adrenaline. Overtraining can increase stress hormone levels, and increase the risk of injury, weariness, and muscle loss. Low levels of progesterone, estrogen, and androgens are caused by overtraining.

Anorexia nervosa, bulimia nervosa, and muscle dysmorphia

A hormonal imbalance can affect how the body experiences hunger and satiety. Although more activity should increase hunger, too much exercise can have the opposite effect. As a result, persons who overtrain may experience major problems with weight loss (26). Excessive exercise has been incorporated into the diagnostic criteria for bulimia nervosa. Hyperactivity is a frequent, fascinating, and well-documented sign of anorexia nervosa. The DSM-5 diagnostic criteria for bulimia nervosa state that compensatory behaviors for binge eating can include self-induced vomiting, intermittent fasting, laxative usage, diuretic use, and excessive exercise. Overtraining is a typical sign of muscular dysmorphia, a disorder that occasionally affects bodybuilders.

Impaired metabolism

Long-term low energy availability can harm many organ systems and result in iron deficiency anemia, low testosterone in men, and reduced bone density (27). Exercise increases calorie burning, especially when done with sports that raise the heart rate, like biking or swimming. They continue to burn more calories after their workout.

Poor immunity

The immune system can get weakened by overtraining, making it more difficult to fight off illnesses such as upper respiratory infections. In fact, Liverpool Hope University recently released a statement in which they caution that engaging in excessive exercise increases your chance of injury and, as a result, disease. That's because an injury lowers your immunity, making it harder for you to fight diseases. Not the best of times, given that a highly contagious virus is the main cause of our collective lockdown (28). According to Dr. Matthew Jackson, a lecturer in sport and health science at the university, "the science underlying exercise and immunity involves the intricate interaction of a number of different cells, including immunoglobulins, sometimes known as antibodies, which can help recognize a virus." As these cells are redistributed and rerouted to vital tissues and organs that are active during exercise, prolonged periods of severe aerobic activity may actually cause immunosuppression. In essence, this indicates that your immunity may be compromised by having too much of a good thing. According to Miranda, overtraining manifests itself as more frequent illnesses than usual.

Over-exercise is addictive

Endorphins are hormones released by your pituitary gland to block pain, lessen anxiety, and foster feelings of euphoric happiness. They are produced by the body as a result of regular exercise. Compulsive exercise, however, has the potential to be psychologically addictive for many people because endorphins share chemical similarities with the drug morphine. Regular exercisers who are bodybuilders, triathletes, cyclists, or marathon runners in particular may experience depression, stress, and anxiety if their exercise routine is suddenly reduced or stopped, or even if they miss one workout. This "mouse on a wheel" attraction to exercise can lead to overtraining, skipping out on family obligations and social events out of a strong "need" to exercise, and worrying that fitness will decline or weight will increase with a day of inactivity. Exercise becomes a chore or a way to feel stuck in a rut, rather than a way to enjoy the beauty of nature or spend time with friends (29).

Over-exercise is correlated with body perception disorders

Body dysmorphic disorder is a psychological condition in which you have excessive concern over a perceived physical flaw in other people, such as their waistline not being slender enough or your arm or leg muscles being too little. This may lead to strenuous, frequently solitary exercise to "correct the fault." Usually starting in youth or early adulthood, this kind of behavior can last a person their entire life as they attempt to obtain or maintain the "ideal figure." Even when it comes at the expense of their joints or health, people may turn to bodybuilding, marathon running, cycling, or any other

exercise that repeatedly recruits the same muscles to try to address their perceived flaws.

Over-exercise can break up families

The Wall Street Journal's article "A Workout Ate My Marriage," which was published in 2010, describes how spouses grow more estranged from one another as they become fixated on a particular exercise goal, such as extreme weight loss or an Ironman triathlon, at the expense of quality time with loved ones. It is frequently challenging for a spouse or family member to bargain with the over-exerciser to spend more time with the family because the exercise aim might be described as "noble" (30).

Over-exercise can causes inflammation

In addition to increasing oxygen use above and beyond what it would be at rest, endurance exercise can also increase the creation of free radicals, which are created when oxygen is needed to convert energy into ATP for muscular contractions. Although regular physical activity can strengthen the antioxidant free radical defense system and cause oxidative damage to muscles and other tissues, severe and high-volume exercise can overwhelm these defenses and result in considerable free radical damage. Free radicals' oxidative stress causes harm to cellular proteins, membranes, and genes as well as systemic, ongoing inflammation. Chronic inflammation is linked to practically every chronic, degenerative ailment you can think of, including cancer, heart disease, strokes, Alzheimer's, Parkinson's, and early aging (31).

Conclusion

Over-exercising typically occurs in people who switch from never exercising to exerting excessive effort to lose weight or get in shape. Frequent exercise should lesser a person's resting heart rate, but over-exercising can have the opposite outcome, comprehending to the NASM. The Mayo Clinic claims that jogging too far too frequently, lifting too much weight, or just pushing yourself too hard can result in stress fractures, shin splints, and muscular strains and sprains; even athletes need days off. Traumatic hematuria might also result from any direct trauma to the kidneys, bladder, or urethra. Exercise addicts could forgo class or time with friends and family to work out. Anorexia nervosa is frequently accompanied by the intriguing and well-documented symptom of hyperactivity. The immune system can get weakened by overtraining, making it more difficult to fight off illnesses such as upper respiratory infections.

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