

## **An Important Adjunct in Prevention and Treatment of Depression**

When we think of the beneficial effects of exercise, most people think about effects on the physical body. Though important, exercise does more for a person than reduce risk of cardiovascular disease and physical fitness. Most do not consider the effect of exercise on the mind and the utility in the prevention and treatment of mental illnesses. Exercise should play an integral role in the treatment plan when healthcare providers treat patients with mental illness specifically major depressive disorder (MDD).

According to the National Institute of Mental Health, 7.1% of all US adults 18 or older reported an episode of depression at some point in their lives. This equates to 17.3 million people and this number is rising annually. Depression clearly affects a large proportion of adults and is a major strain on the healthcare system. For years, first-line treatment for MDD has involved pharmacotherapy and psychotherapy. First-line treatment for depression is generally effective with 70-90% of patients reporting improvement(1). That being said, like any pharmacologic intervention, antidepressants come with side effects. Additionally, successful treatment with drugs involves some trial and error with drug choice and dosing to find an adequate treatment regimen. This creates a time period where patients are still experiencing symptoms while figuring out the optimal treatment. Exercise can pose as a useful adjunct to not only bridge this gap, but also potentially raise the efficacy of antidepressant therapy and reduce additional episodes of depression.

A Cochrane review in 2013 comparing the effects of depression to placebo, pharmacotherapy, and psychotherapy found that exercise was superior to placebo (standardized mean difference = -0.62) and noninferior to either pharmacotherapy or psychotherapy(2). A small study (n = 121) comparing the effects of physical exercise in conjunction with sertraline to sertraline alone found that the physical exercise treatment group had higher rates of remission (83% to 45%) and shorter time to remission than the sertraline alone group(3). Another meta-analysis of 25 randomized-controlled trials found exercise to have large and significant antidepressant effect in people with depression(4).

Exercise has also been shown to be effective in preventing the development of depression. The HUNT trial followed over 33,000 adults with no symptoms of mental illness for 11 years. They looked at participants baseline exercise levels at the beginning of the study in number of minutes. They found that those who reported no exercise at baseline had 44% higher increased odds of developing depression compared to those who exercised 1-2 hours per week. Interestingly, there was no dose-dependent response measured. The researchers found no increased benefit of a higher amount of exercise over 1-2 hours per week(5). Pederson et al. estimate that if all participants had exercised at least 1 hour per week, then 12% of the cases of depression could have been prevented(5). Additionally, exercise seems to have a long-lasting effect. Two studies found that exercise had a lasting antidepressant effect for between 6 and 21 months (6, 7).

Though the type or intensity of exercise does not seem to play a critical role in the antidepressant effect, there are some recommendations that providers can counsel patients on to give them the highest chance of reaping the benefits of exercise. For example, though there is no difference between aerobic exercise (i.e. running, swimming, walking) or anaerobic exercise (i.e. resistance training) in the absolute reduction of depressive symptoms, aerobic exercise may be more feasible(8). Logistically, walking or running can be easier to start compared to resistance

training. For the latter, one needs access to a gym or weights. Additionally, the National Institute of Health and Care Excellence recommended structured, supervised, group exercise for at least 45 minutes several times a week for at least 10 weeks to see the strongest antidepressant effect from exercise(8).

Clearly, exercise has a real and measurable effect in both treating and preventing depression. Although the mechanism of action of the antidepressant effect of exercise is still not fully understood, it is most likely to be multifactorial. There are several mechanisms that have been proposed. At the most basic level, exercise can be used as a distracter from the intrusive thoughts of depression (9). An increase in feelings of self-efficacy could also play a role in the antidepressant effect of exercise(10). Improving people's self-efficacy is a central tenet of cognitive-behavioral therapy, so this hypothesis makes sense. Additionally, group exercise can serve as a bonding experience between individuals and create a sense of community, which can play a role in alleviating depressive symptoms(8). At the molecular level, the effect of exercise is more complicated in regard to depression. Exercise has been shown to increase levels of brain-derived neurotrophic factor (BDNF), vascular endothelial growth factor, endorphins, and serotonin(6, 10, 11). BDNF and serotonin are known to be increased by antidepressants and electroconvulsive therapy(12, 13). Exercise also increases neurogenesis in several areas of the brain including the hippocampus, anterior cingulate cortex, and prefrontal cortex (9, 11, 14). Additionally, exercise has been shown to have some anti-inflammatory effects (15). Finally, the thermogenic hypothesis postulates that exercise increases temperature in certain brain areas such as the brain stem, which leads to an overall feeling of relaxation(10).

Physicians counsel patients to exercise on a regular basis for chronic physical diseases such as hypertension and diabetes mellitus, which is incredibly important for health maintenance. In regard to mental illness, physical activity is recommended at much lower rates. One study found that though 85% of patients at a mental health outpatient clinic wanted to become more active, only 37% of patients discussed physical activity with their provider w(16). Exercise will not replace antidepressants as the most effective treatment for depression by any means, but the above percentage is much too low. When physicians treat patients, they should treat more than just the disease and focus on how to improve the patient's quality of life. Participating in exercise within a group setting can help build relationships and a sense of community. It is also a simple way to treat any co-morbid chronic diseases that an individual may be struggling with. Exercise is quite simply one of the best treatments available to improve an individual's quality of life socially, physically, and mentally.

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