

Chapter 4

Psychological and/or Mental Health Benefits of Maintaining Activity and Exercise



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What Is Mental Health?

Mental health does not just refer to preserving cognitive abilities. The World Health Organization (WHO) defines mental health as “a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community” [1]. The WHO definition tells us that the brain is more than just a thought-processing tool; it allows us to have feelings, emotions, desires, motivations, and character. It allows us to function as individuals, be with loved ones in a family, take on jobs, and interact socially with our community. The ability for one to maintain mental health differs among individuals, whether due to family history, upbringing, personal sets of moral values, etc., but just as in cognitive decline, there are ways to try preventing mental health decline. Research has shown that lifelong exercise may be able to contribute toward lifelong mental health.

Mental health disorders are very common in our society. According to the National Comorbidity Survey Replication (NCS-R), a national household survey of the prevalence of mental disorders in the USA [2], about half of Americans will meet the criteria for a mental health disorder sometime in their life. The survey determined that the lifetime prevalence for anxiety disorders was 28.8%, mood disorders (which includes depression) was 20.8%, impulse-control disorders was 24.8%, and substance abuse disorders was 14.6% [3]. While the study showed that some of these disorders have onset of symptoms during adolescence and early

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adulthood, many of these disorders have onset during adulthood at any stage and can be triggered by many environmental factors that may be preventable. Depression and anxiety are two of the most common conditions that affect mental health within the population, and they are also less likely to have genetic and biological roots, as opposed to other disorders such as bipolar disorder and schizophrenia. In this chapter, we will look at how lifelong exercise may be helpful toward maintaining mental health, especially in battling these two diseases.

The Effect of Physical Activity on Depression

Based on the neurobiological model of depression, there is dysregulation of various key biological amines or neurotransmitters within the central nervous system: norepinephrine (NE), dopamine (DA), and serotonin (5-HT). Upregulating these amines are the main targets of pharmacologic treatments for depression. Physical activity and exercise can also have the same antidepressant effects by acting through upregulation via those same biological mechanisms. Various animal and human studies have shown increased metabolites of NE and 5-HT in plasma and urine samples after exercise; however, this result has been difficult to reproduce and confirm widely. In some animal studies, chronic wheel running has been associated with elevated NE levels in the brain. Other studies in animals have found an increase or no change in brain 5-HT levels after acute exercise but an overall decreased turnover of 5-HT with chronic exercise [4]. These studies lack uniformity in experimental methods and data analysis, especially considering the measurement of brain amine levels is usually derived from some other measurement. Other studies have implicated the role of opioid receptors as a mechanism for exercise's effect on mood [5]. Effects mediated by the endogenous opioid system following exercise, such as joy and euphoria, have been able to be reversed by use of naloxone [6]. Despite the complexity involved in understanding the neurobiology of exercise on the brain, the general hypothesis for the role of exercise in the CNS is that exercise stimulates multiple systems that may produce significant short- and long-term antidepressant effects.

Research has supported the implementation of this hypothesis in the clinical treatment of depression. A randomized controlled trial of 202 adults with clinically diagnosed depression who were assigned to 4 months of placebo, pharmacotherapy, home-based exercise therapy, and supervised group exercise therapy showed that the rates of remission tended to be higher for active treatments compared to placebo (supervised exercise = 45%, home-based exercise = 40%, medication = 47%, placebo = 31% ($p = 0.057$)) [7]. The rates of remission showed that exercise treatments were comparable to pharmacotherapy and may be a more advisable when beginning treatment for depression. Another randomized controlled study tried to quantify the dose of exercise that could be responsible for an effect on depression. They found that after 12 weeks, the "public health dose" of 17.5 kcal/kg/week (or about 1500 calories per week for a 200 lb. person) divided into 5 days per week had a higher

reduction in the 17-item Hamilton Rating Scale for Depression scores (47%) compared to lower-dose exercise (30%), which was 7 kcal/kg/week divided into three times a week, and placebo (29%) [8]. Before this study was published, there had been no studies that examined the effect of varying frequency, intensity, and duration of exercise on depression. What this study demonstrates is the correlation between higher total energy expenditure and greater reduction in depressive symptoms, which could have important clinical value in treating depression.

The Effect of Physical Activity on Anxiety

Although the neurobiological model of anxiety differs from that of depression, they influence the same pharmacologic targets (DA, NE, and 5-HT), and exercise may facilitate the same beneficial effects on the CNS toward treating anxiety [9]. The amount of research that has been conducted using exercise as a treatment method for anxiety is not as abundant as the research supporting exercises in the treatment of depression. Nonetheless, the available literature does suggest a positive and useful role for exercise in this arena. One study showed that in a group of participants who underwent 8 weeks of aerobic training involving either jogging or walking, those participants who had higher levels of fitness at 6-month follow-up had overall decreased anxiety symptoms compared to baseline [10]. A randomized controlled trial looking at the effects of exercise training in combination with cognitive behavioral therapy saw differing effects of exercise when attempting to treat various anxiety disorders, such as generalized anxiety disorder, social phobia, and agoraphobia [11]. All groups in this study experienced significant reductions in anxiety, depression, and stress scores; however there was a significantly greater reduction in the exercise and CBT groups compared to the control group, confirming the added benefit of exercise therapy in decreasing anxiety.

Long-Term Effects of Maintained Exercise and Fitness on Mental Health

There is much evidence that links long-term exercise to preserved mental health. Cross-sectional surveys examining multiple groups of people in the USA and Canada over the span of 10 years showed that higher levels of physical activity were positively associated with general well-being, lower levels of anxiety and depression, and overall positive mood, and this trend was especially strong in women and people aged 40 and above [12]. Adults randomized to a 12-week aerobic fitness program demonstrated increased fitness as measured by bicycle ergometer test as well as improvement in depression, anxiety, mood, and self-concept scores compared to a control group immediately after fitness intervention, and the improvement in psychological scores for the exercise group were maintained at 1-year follow-up [13].

Similarly, another group of healthy adults who were assigned to a 6-month aerobic fitness program saw improvements in psychological scores related to physical appearance and fitness compared to the control group [14]. These findings suggest that improvements in self-perception could permeate into improvements in other areas of self-worth and well-being, thereby reducing the likelihood of depression and anxiety.

Conclusions

Depression and anxiety are two of the most common debilitating mental health conditions. Fortunately, studies have demonstrated that physical activity and exercise can help treat and even prevent these two conditions. Of course, there are many factors that contribute to mental health, such as comorbid disease, genetics, family history, and social environment. In these cases and other circumstances, exercise may not be as powerful a tool in treating depression and anxiety. However, it is important to note the positive correlation between higher levels of exercise and long-term states of well-being reinforcing the link between a healthy body and a healthy mind. As musculoskeletal clinicians it is important to understand that our roles in maintaining or returning mobility in the lives of our patients can have a profound impact on not only their physical health but in modulating the outcomes of mental health as well.

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