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## The Impact of Exercise on Mental Health: The Use of Exercise as Prevention and Treatment for Mental Health Disorders

Abigail Stivers  
*University of Northern Iowa*

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THE IMPACT OF EXERCISE ON MENTAL HEALTH: THE USE OF EXERCISE AS  
PREVENTION AND TREATMENT FOR MENTAL HEALTH DISORDERS

A Thesis Submitted  
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Abigail Stivers  
University of Northern Iowa  
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This Study by: Abigail Stivers

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Approved by:

Mary McDade, Honors Thesis Advisor, Department of Biology

Dr. Jessica Moon Asa, Director, University Honors Program

## **Introduction**

Mental health is one of the most crucial dimensions of well-being that is necessary for human wellness. However, it is also one of the most neglected aspects of individuals' health, often resulting in the development of mental health disorders. There are multiple methods of treatment that can be used to support and improve mental health, one of which is exercise. While exercise is commonly prescribed as a form of prevention and treatment for physical ailments, such as hypertension and heart disease, it is often overlooked as being applicable to illnesses related to mental health. Furthermore, medications and therapy are more frequently used for treating and preventing mental health disorders than exercise. However, while exercise may not yet be as prevalent of a treatment as medications or therapy, there is a growing body of evidence that suggests there is a positive correlation between regular exercise and mental health. In order to better understand the relationship between exercise and mental health, a comprehensive literature review was conducted. The purpose of this literature review is to identify and explain the impact that exercise has on mental health and how it can be used as an intervention for mental health disorders.

## **Background**

### **Mental Health**

Mental health is a multidimensional state of well-being. It encompasses the emotional, psychological, and social well-being of an individual (United States, Department of Health and Human Services, Centers for Disease Control and Prevention [CDC]). The state of an individual's mental health affects their cognitive ability, the way that they experience emotions, and their ability to make decisions and manage stress (CDC). Mental health plays a significant role in every stage of life, and there are multiple factors that influence it. The primary

contributors include biological factors (e.g. genes, brain chemistry, etc.), life experiences (e.g. trauma, abuse, etc.), family history, and choice of lifestyle (e.g. diet, use of alcohol or drugs, etc.) (CDC). These factors play an important role in the development of mental health disorders.

### **Mental Health Disorders**

Mental health disorders are among the most prominent health issues plaguing the human population (Gustavson et al.). Every year, millions of people experience disruption in their lives as a result of mental health disorders. In the United States, an average of 1 in 5 individuals suffer from at least one mental health disorder (CDC). Some of the most common mental health disorders include mood and anxiety disorders (Gustavson et al.). These disorders can be further broken down into subcategories. Two of the primary mood disorders include major depression and bipolar disorder (Bridley and Daffin). A few common anxiety disorders include phobias, panic disorder, post-traumatic stress disorder, and generalized anxiety disorder (National Institute of Mental Health [NIMH]). These disorders are among the most common mental health disorders plaguing Americans.

The variety of anxiety disorders that exist differ according to the specific objects or situations that cause them to occur, but they share the common features of excessive fear and anxiety and the related behavioral disturbances (Bridley and Daffin). Concerning the prevalence of anxiety disorders among Americans, it is estimated that 31.1% of adults aged 18 and older experience symptoms of an anxiety disorder at some point in their lives (NIMH). Among adolescents aged 13 through 18 in the U.S., it is estimated that 31.9% of them experience an anxiety disorder (NIMH).

Mood disorders are identifiable by the impact that they have on individuals' persistent emotional state, or their mood. Commonly, an individual's mood ranges from depressive lows to

euphoric highs. In the United States, approximately 21.4% of adults aged 18 and older experience a mood disorder at some point during their lifetime (NIMH). Concerning the younger population, it is estimated that 14.3% of American adolescents aged 13 through 18 experience a mood disorder (NIMH).

In a primary care setting, many anxiety and mood disorders are often treated with psychotherapy, medications, or both (Bridley and Daffin). Although exercise is not as commonly used as a treatment, a growing body of research shows that it has the potential to significantly improve the symptoms of some anxiety and mood disorders. For the purpose of this study, focus will be placed on how exercise impacts the disorders that are most prevalent, including generalized anxiety, PTSD, and major depression.

### **Exercise**

Physical activity and exercise both have a significant impact on mental health and have the potential to be used as interventions or treatments for mental health disorders. However, for the purpose of this study, a distinction must be made between the two terms. The term *physical activity* refers to “any bodily movement produced by skeletal muscles that require energy expenditure” (Dasso 45). Physical activities can range from participating in sports, to completing household chores, to going on a walk. Thus, *physical activity* is a broad term. The term *exercise*, on the other hand, is “a subcategory of physical activity that is planned, structured, repetitive, and purposefully focused on improvement or maintenance of one or more components of physical fitness” (Dasso 45). In other words, exercise is performed with a specific purpose in mind while physical activity encompasses any type of bodily movement, whether purposeful or not. Given that the term *exercise* has a more precise definition and direct purpose, it will be the primary focus in this study.

## **Literature Review**

### **Overview of the Relationship Between Exercise and Mental Health**

Exercise is an important factor in the maintenance of individuals' happiness and mental well-being. Mental health is influenced by both biological and environmental factors, and both have the potential to increase the risk of developing mental health disorders. Concerning the environmental factors, experiences within an individual's environment can have a major impact on the development of mental health disorders, such as how the individual was raised, whether or not they have experienced trauma in their life, and the levels of stress that they experience daily (Karrie et al.). Biologically, factors such as genetics, the state of physical fitness, chemical imbalances in the body, and increased activity in certain areas of the brain play a role in the development of mental health disorders (Weir 30). When performed regularly, exercise has the potential to alleviate the various factors that increase the risk of developing mental health disorders.

### **Neurophysiological Mechanisms of Exercise**

In a study on the relationship between mental health and exercise, it was determined that there are multiple physiological and biochemical hypotheses that explain the mechanisms through which exercise positively affects mental health. According to the study, various hypotheses include neurotransmitter dysfunction, the endorphin hypothesis, the thermogenic hypothesis, mitochondrial dysfunction, mammalian target of rapamycin (mTOR), and the hypothalamic-pituitary-adrenal (HPA) axis (Mikkelsen et al. 48). Additional hypotheses include the monoamine hypothesis, changes in the levels of brain-derived neurotrophic factor (BDNF), neurogenesis, and the enhancement of self-efficacy (Anderson and Shivakumar). These hypotheses have all been proposed to play a role in the existence of mental health disorders.

## **Neurotransmitter Dysfunction and Monoamine Hypothesis**

Neurotransmitters are chemical messengers that are responsible for the transfer, amplification, and balance of signals that go between nerve cells, also known as neurons, and target cells located throughout the body. Many distinct types of neurotransmitters exist in the body, and they are intricately involved in the normal functioning of everyday life. Furthermore, the dysfunction of neurotransmitters and their receptors can play a role in the development of mental health disorders. Some common examples include the roles that dopamine, serotonin, and norepinephrine play in mood disorders, such as depression, and anxiety disorders, such as generalized anxiety disorders and OCD (Cherry).

The monoamine hypothesis proposes that mental health disorders, such as depression, are caused by a deficit in the production or reuptake of monoamine neurotransmitters, which include dopamine, serotonin, and norepinephrine (Lin and Kuo 40). These neurotransmitters play a role in the regulation of exercise-induced enhancement of diverse functions in the brain. Exercise is capable of stimulating the monoamine systems, aiding in the improvement of mental health.

Dopamine is a monoamine neurotransmitter responsible for mood regulation and producing feelings of pleasure, satisfaction, and motivation. In mental health problems such as mood and anxiety disorders, dopamine deficiency has been attributed to be one of the potential causes. Through various studies, exercise has been shown to increase the concentrations of dopamine in the brain and the binding affinity between dopamine and dopamine receptors, as well as decrease the breakdown of dopamine in certain areas of the brain (Lin and Kuo 42). Hence, the therapeutic effects of exercise on the regulation of dopamine have been attributed to the reduction of symptoms of mood and anxiety disorders.

Serotonin is another monoamine neurotransmitter that participates in mood regulation.



Serotonin deficiency is often attributed as a possible cause of mood and anxiety disorders. The serotonin system can be modulated by exercise, the results of which include an increase in the serotonin concentration and serotonin receptors in areas of the brain such as the hippocampus (Lin and Kuo 44). These results indicate that exercise can be used as an effective approach to reduce symptoms of anxiety and provide protection in the brain against stress.

Norepinephrine is the third monoamine neurotransmitter, and it is responsible for mobilizing the brain for action during “fight or flight” and can increase levels of energy and alertness. Elevated levels of norepinephrine have been associated with symptoms of anxiety disorders. Exercise has been shown to boost the adaptation of neurons against stimuli that are associated with uncontrollable stress, resulting in a suppression of the release of norepinephrine (Lin and Kuo 43). The result of the reduction in norepinephrine release is the confinement of anxiety-like behavior and improved mental health.

Based on these findings, it can be concluded that exercise plays an important role in the regulation of the levels of monoamine neurotransmitters. Due to the regulatory capabilities of exercise, it has the potential to be used as an option for the treatment and prevention of anxiety and depressive disorders.

### **Endorphin Hypothesis**

Endorphins are neurotransmitters that function in relieving pain and reducing stress in the body, as well as improving an individual’s mood. According to the endorphin hypothesis, exercise positively impacts mental health, particularly depression, due to an increase in the release of endorphins after a period of exercise has taken place (Craft and Perna 107). In addition to the increase in endorphin release, exercise has also been shown to increase the binding of endorphins to their designated receptor sites in the brain (Anderson and Shivakumar). The

endorphin hypothesis is supported by the phenomenon of the “runner’s high.” The “runner’s high” is connected to the release of endorphins, which is responsible for improving the runner’s mood and creating a feeling of euphoria after the run has been completed (Craft and Perna 107). This means that the euphoric feeling that runners experience is attributed to an increase in the levels of plasma endorphins that occurs in an individual after engaging in acute and chronic exercise. Based on these findings, it is indicated that exercise can be used as an intervention in mood disorders such as depression.

### **Thermogenic Hypothesis**

The thermogenic hypothesis proposes that the elevation in an individual’s mood following exercise has connections to a rise in body temperature (Craft and Perna 107). The increase in temperature occurs in locations of the brain such as the brainstem, resulting in decreased muscle tension and increased feelings of relaxation (Craft and Perna 107). While there are limited studies addressing this hypothesis, the results of the available studies suggest that exercise has the potential to improve mental health through the effect it has on the temperature of the brain.

### **Mitochondrial Dysfunction**

Mitochondria, also known as the “powerhouse of the cell,” are organelles found in eukaryotic cells and are responsible for playing a role in numerous biological processes, including the maintenance of neuronal homeostasis (Giménez-Palomo et al.). Some of the processes that mitochondria are involved in include the production of energy, reactive oxygen species (ROS) metabolism, calcium homeostasis, cell death (apoptosis), synaptic plasticity and formation of neurons, regulating the activity of neurons, and preventing damage of neurons. In the context of mental health problems such as mood disorders, dysfunction of the mitochondria

can compromise neuronal homeostasis and cause a loss of control in these processes (Giménez-Palomo et al.). The loss of mitochondrial control can be detrimental to mental health.

Exercise has been shown to have a direct link to several mitochondrial processes. Some of these processes include an increase in the formation of mitochondria, enhanced capabilities regarding mitochondrial content and utilization of oxygen, and a decrease in the loss of mitochondrial content in skeletal muscle, particularly in elderly people (Giménez-Palomo et al.). Furthermore, there is evidence suggesting that mitochondrial enhancement produced by exercise has antidepressant effects (Giménez-Palomo et al.). Consequently, exercise may be used as a way to treat mental health problems such as mood disorders through the improvement of mitochondrial function.

### **Mammalian Target of Rapamycin (mTOR)**

The mammalian target of rapamycin (mTOR) is a serine-threonine kinase, which is a special type of enzyme that plays a vital role in the regulation of cell growth and reproduction (Garza-Lombó and Gonsebatt). This particular kinase is responsible for sensing and integrating signals that are set off by extracellular and intracellular stimuli (Ryskalin et al. 2006). Some of the signals that mTOR manages are triggered by stimuli such as changes in the amino acid supply and alterations in the energy state of the cells (Garza-Lombó and Gonsebatt). Additional signals come from hormone and growth factor receptors, and the transduction of neurotransmitters and neurotrophin produce signals from the brain as well (Garza-Lombó and Gonsebatt).

The mammalian target of rapamycin has been demonstrated to be involved in several important brain functions. The activation of mTOR provides a vital contribution to processes involved in functions such as the control of metabolism and the development of neurological

pathways in the brain (Garza-Lombó and Gonsebatt). Other functions in which the involvement of mTOR has been implicated include changes in the strength of neuronal junctions, also known as synaptic plasticity, and the regulation of autophagy, or maintaining the balance between building up and breaking down molecules (Ryskalin et al. 2026). Through the involvement that mTOR has in brain functions, the mental health of individuals is impacted.

The role that mTOR plays in various brain functions is connected to enhanced learning and memory, as well as the regulation of emotional behavior through antidepressant effects. It has also been indicated that mTOR has a high level of sensitivity to exercise-induced signals, such as metabolic factors. In a study involving the effects of exercise on the levels of phosphorylated mTOR (p-mTOR) in rats, it was demonstrated that exercise increases the levels of p-mTOR in the learning and emotional behavior regions of the brain (Lloyd et al. 56). The increase of mTOR signaling in the brain is a potential contributor to the positive effects that exercise has on cognitive function and mental health disorders such as anxiety and depression (Lloyd et al. 56). Through the effect that exercise has on mTOR signaling, exercise may be used as a treatment for anxiety and depressive disorders.

### **Hypothalamic-Pituitary-Adrenal (HPA) Axis**

The hypothalamic-pituitary-adrenal axis, also known as the HPA axis, is composed of the hypothalamus region of the brain, the pituitary gland, and the adrenal gland. The HPA axis plays a critical role in the body's ability to adaptively respond to internal and external stressors. Abnormalities in the regulation abilities of the HPA axis are associated with symptoms of anxiety and depressive disorders (Anderson and Shivakumar). Through the mechanism of the HPA axis, stress can have an impact on the levels of various hormones. In response to acute stress, alterations in adrenocorticotropic hormone (ACTH) and increased levels of

glucocorticoids can occur (Anderson and Shivakumar). In response to chronic stress, as seen in anxiety disorders such as PTSD, decreased levels of peripheral cortisol and increased levels of glucocorticoid receptors can occur, causing an elevation in central feedback sensitivity (Anderson and Shivakumar).

Corticotropin-releasing factor (CRF), also known as cortico-releasing hormone (CRH), has a critical role in the body's response to stress through the regulation of the HPA axis (Smith and Vale 384). Studies on the effects of exercise on the HPA axis have shown that exercise causes a change in the release of CRF from the hypothalamus and ACTH from the front lobe of the pituitary gland (Anderson and Shivakumar). The findings of these studies indicate that through alterations in the HPA axis, exercise can help regulate anxiety and the body's response to stress.

### **Brain-Derived Neurotrophic Factor**

Neurotrophic factors are a specific group of proteins that function in the proliferation and differentiation of neurons. Brain-derived neurotrophic factor, or BDNF, is one of the brain's most abundant neurotrophic factors and is responsible for promoting the different stages of neuron development in the nervous system (Suliman). Reduced levels of BDNF in the brain, especially in the hippocampus, have been associated with depressive and anxiety disorders that are stress-related (Anderson and Shivakumar). Furthermore, it has been suggested that an increase in BDNF has antidepressant effects, aiding in the reduction of anxiety-like symptoms (Anderson and Shivakumar). An increase in BDNF can be brought about by medications, such as antidepressants, as well as by exercise. In addition to this, exercise-induced increases in BDNF can improve the performance of the serotonergic system and stimulate neuron development (Anderson and Shivakumar). This evidence indicates that exercise may be useful in mitigating

the effects of mental health disorders, such as anxiety and depression, which are caused by decreased levels of BDNF.

### **Neurogenesis**

Neurogenesis involves the formation of neurons in the brain. Decreased neurogenesis, particularly in the hippocampus, has been associated with anxiety disorders such as generalized anxiety, and mood disorders such as major depression (Schoenfeld and Cameron 113). The decrease in neuron formation that correlates with mental health disorders is often attributed to increased levels of stress. When the hippocampus endures chronic stress, it can become increasingly sensitive to the toxicity of excessive glucocorticoids (Anderson and Shivakumar). Medications such as antidepressants are commonly used to treat anxiety and depression due to the positive effect they have on neurogenesis (Schoenfeld and Cameron 113). According to studies, it has been suggested that exercise also promotes neurogenesis in the brain, especially in the hippocampus (Anderson and Shivakumar). Given that exercise can increase neurogenesis in the brain, it is indicated that exercise has the potential to have the same effect on anxiety and depressive disorders as antidepressants.

### **Self-Efficacy and Self-Esteem**

Self-efficacy and self-esteem are both concepts that involve an individual's view of themselves. Self-efficacy refers to the confidence a person has in their ability to exert control over their actions in order to reach certain goals while self-esteem focuses on the perspective the person has of themselves and their personal worth. Both of these concepts are impacted by exercise and may be used to improve mental health.

Self-efficacy in regard to an individual's ability to self-govern potential threats is interrelated to the stimulation of anxiety. When individuals maintain an increased sense of self-

efficacy, they have more confidence in their ability to manage situations that they perceive as potential threats and experience lower levels of stress and anxiety (Anderson and Shivakumar). It has been proposed that exercise can improve self-efficacy by providing experiences that improve an individual's conscious control of their behavior. As the individual's fitness level increases, so should their sense of self-efficacy, resulting in a decrease in anxiety and stress (Anderson and Shivakumar).

Exercise is a key factor in the maintenance of individuals' happiness and mental well-being. There is a positive correlation between participation in exercise and mental health; participation in exercise can reduce depression and anxiety within individuals while also improving self-esteem, particularly self-concept (Kim and Jihoon). Self-concept is a sub-factor of self-esteem and can be defined as "one's perception or evaluation of their physical ability and physical appearance" (Kim and Jihoon). According to a study of the impact of exercise on mental health in university students, students that participated in a physical education class displayed increased levels of self-esteem, specifically self-concept, and overall mental well-being (Kim and Jihoon). Another similar study involving adolescents' participation in exercise concluded that increased levels of cardiorespiratory fitness resulted in a decrease in symptoms of depression, anxiety, and improved self-concept (Haverkamp et al.). Through participation in exercise, individuals are able to improve their perception of their physical bodies and overall self-esteem, as well as positively impact various aspects of their mental health.

### **Impact of Stress on Mental Health Disorders**

Stress is a major health problem and impacts both physical and mental health. Physically, stress can contribute to illnesses such as obesity, cardiovascular disease, and suppression of the immune system (Jackson 15). As mentioned in a few of the earlier hypotheses, stress also plays a

significant role in the development of mental health disorders and has an impact on the prevalence of them. According to research, chronic or long-term stress can cause people to become more prone to developing mental health disorders (Sanders). Increased levels of stress can alter the connections between different regions of the brain, causing a disruption in normal communication (Sanders). One example where this is demonstrated is in people who are diagnosed with anxiety disorders such as post-traumatic stress disorder. Individuals who suffer from PTSD may develop a stronger connection between the hippocampus and the amygdala, which correlates to the brain's "fight or flight response," and a weakened connection between the hippocampus and the prefrontal cortex, which is responsible for moderating the body's response to stress (Sanders). As a result, the brain's "fight or flight" response has higher occurrences of activation with lower ability to moderate the response. Hence, chronic stress can lower the brain's tolerance of additional stressful events, consequently increasing an individual's predisposition to certain mental health disorders.

### **Impact of Exercise on Stress and Mental Health Disorders**

Anxiety and mood disorders are some of the most prevalent types of mental health disorders. The two types of disorders are often existing simultaneously with and usually independent of another medical condition, particularly seen in the high comorbidity rates of anxiety and depression (Bridley and Daffin). Furthermore, chronic stress can increase the likelihood of developing these disorders (Sanders). Both anxiety and mood disorders are often treated with medications, but exercise provides an option for an alternative form of treatment and prevention.

Exercise has a significant impact on the levels of stress and may help to reduce them. There are consistent findings that regular exercise can reduce feelings of stress and have a



calming effect that can extend several hours postexercise (Jackson 16). The primary mechanisms responsible for this include the positive effect of exercise on the release of neurotransmitters, which was previously discussed, and the theory that exercise provides a “time-out” from daily stressors (Jackson 16). One study found that college-aged women who took a break from study and engaged in 40-minute sessions of exercise reported that they had decreased levels of stress and felt calmer (Jackson 16). The results of another study on the impact of exercise on stress indicated that individuals who participated in regular exercise had increased resistance to bouts of acute stress (Childs and de Wit). Consequently, improved resilience to acute stress may provide protection against developing chronic stress in the future, which in turn decreases the chances of developing additional mental health problems (Childs and de Wit). Thus, exercise can help to improve resilience to stress and improve overall mental wellness.

A wide array of studies has documented the effects of exercise on anxiety-related disorders. One meta-analysis included several trials on individuals concerning the effect of exercise on anxiety disorders including generalized anxiety disorder, panic disorder, and post-traumatic stress disorder or PTSD (Stubbs et al. 104). According to the results of the study, exercise significantly reduced symptoms of anxiety in individuals who were diagnosed with one of the disorders (Stubbs et al. 104). Another study involved an observation of the effect of exercise on cross-country skiers (Svensson et al.). The results of the study indicated that individuals who participated in skiing were less likely to develop an anxiety disorder than non-skiers (Svensson et al.). Another meta-analysis identified studies in which participants with diagnosed anxiety disorders or raised anxiety were treated with aerobic exercise, the results of which showed that exercise was an effective treatment (Aylett et al.). A fourth study that focused on the effects of exercise on individuals diagnosed with PTSD suggested that aerobic exercise

reduces symptoms of PTSD across a range of populations (Hegberg et al.). The evidence presented in these studies indicates that exercise may be an effective intervention for anxiety disorders.

A large number of studies have also been conducted concerning the impact of exercise on mood disorders. According to many studies on the effects of exercise on clinical depression, there is a large amount of evidence supporting the positive impact of exercise on depression. One study involved an exercise intervention consisting of an aerobic regime for individuals diagnosed with depression (Craft and Perna 105). The reported results of the study demonstrated that exercise was effective in reducing symptoms of depression and that individuals who engaged in the exercise regime had a greater reduction in depressive symptoms than the control group (Craft and Perna 105). Another study also found that exercise decreases symptoms in individuals diagnosed with major depression (Schuch et al. 42). Research on the effects of exercise on depression suggests that a reduction in symptoms may be experienced in as short as 12 weeks after starting an exercise regime (Craft and Perna 105). Furthermore, after a 12-month follow-up period with participants diagnosed with depression, it seemed that exercise had a long-lasting effect on the status of their mental health (Craft and Perna 105). Hence, the analytical evidence that has been presented supports the theory that exercise has the potential to be used as a form of treatment for mood disorders, particularly depression.

### **Recommendations for Exercise**

According to the current recommendations for exercise, individuals should engage in aerobic exercise at a moderate intensity level at least 5 days per week, for a minimum of 150 minutes per week (Stanton et al. 45). An alternative option is to engage in vigorous aerobic activity at least 3 days per week, for a minimum of 75 minutes per week (Stanton et al. 45). In

addition to aerobic exercise, it is also recommended that individuals perform some form of resistance exercise or strength training for a minimum of 2 days per week (Stanton et al. 45). Despite the current exercise recommendations that are in place, treatment plans involving the implementation of an exercise program may be modified at the discretion of the provider in order to create the best fit for each patient.

## **Discussion**

### **Considerations for Clinical Practice**

Based on the evidence that supports the positive impact of exercise on mental health disorders such as anxiety and depression, it is implicated that exercise could be used as an alternative to medications and therapy in the treatment of mental health disorders. As previously mentioned, mental health disorders such as anxiety and depression are often treated with medications such as antidepressants or therapies such as cognitive behavioral therapy (Bridley and Daffin). However, medical providers should be aware that there may be patients who desire an alternative treatment plan for their mental disorder. Hence, exercise programs have the potential to be offered as an alternative.

When designing an exercise program for individuals with mental health disorders, providers should be mindful of the possible psychological and physical challenges that may arise with the patient's initiation and maintenance of the program (Stanton et al. 52). As a result, providers should be prepared to offer or provide support systems for their patients to assist them in their exercise programs. This support could come in various forms, some of which include providing patients with resources such as personal trainers or advocacy groups (Stanton et al. 52). A potential challenge that providers should take into consideration when designing an exercise program is the individual personalities of their patients and their personal comfort levels

with various social settings. For example, typical gyms or fitness centers may cause a patient with an anxiety disorder to experience even more anxiety based on the social setting and might counteract the benefits of exercise in that particular setting. Thus, providers should be prepared to offer different locations in which the exercise regime can be performed in order to accommodate the personal preferences of patients.

Other considerations that medical providers should keep in mind when creating a treatment plan that involves an exercise program are the fitness level of their patients, as well as the type and duration of exercise they are capable of and would enjoy participating in. Individuals who are more physically fit will be capable of withstanding a higher intensity and longer duration of exercise than individuals who have reduced physical fitness. Furthermore, certain types of exercise may be more appealing to individuals than others, resulting in an increased level of motivation and enjoyment when participating. Hence, providers should keep these factors in mind when designing the exercise regime in order to create an enjoyable experience for their patients.

A final consideration that providers should be mindful of in the process of designing an exercise regime for the treatment of mental health disorders is whether or not their patients have a tendency to develop addictions. While exercise can provide numerous benefits for individuals with mental health disorders such as anxiety and depression, the benefits may not outweigh the risks of causing further issues for individuals who also suffer from addictive personalities. In fact, individuals who suffer from disorders such as eating disorders, anxiety, depression, and other addictive disorders are identified as having an increased risk of developing an exercise addiction (Colledge et al.). As a result, providers need to be extremely mindful of this in order to prevent a treatment plan involving exercise from causing more harm than good.

## **Limitations**

This research has some limitations regarding the effectiveness of exercise as an intervention in the treatment of mental health disorders. Some of these limitations include the increased benefit of exercise for some types of mental health disorders compared to others, the enhanced effectiveness of some types of exercise instead of others, and the variability in the impact on different genders. These limitations were not very frequently addressed, hence further research should be conducted in order to learn more about how they affect the impact of exercise on mental health.

A majority of the reviewed research supports exercise as a treatment for anxiety and depressive disorders. However, there is less available evidence for the impact that exercise has on other disorders, including psychotic disorders, such as schizophrenia, and substance abuse disorders. Therefore, additional research is necessary to understand the full scope of the potential of using exercise as a form of treatment and intervention in all prevalent mental health disorders.

Another area of research that should be further explored is the impact that different types of exercise have on mental health. For example, some studies suggest that high-intensity aerobic exercise such as biking or running has a larger impact on mental health disorders than lower or moderate-intensity exercise such as pilates or yoga (Borrega-Mouquinho et al.). Additional studies have indicated that both strength training and aerobic exercise may significantly impact mental health disorders (Schuch et al. 42) In order for providers to create the most effective treatment plans involving exercise, it is important to determine which type of exercise will result in the greatest benefits for individuals experiencing symptoms of mental health disorders.

A third area that would benefit from further research is the impact of exercise on mental health disorders in different genders. Due to biological factors, exercise affects males and

females differently, resulting in varying levels of impact of mental health disorders in relationship to gender. Consequently, it is important for providers to consider the differences in the impact of exercise on mental health disorders in males and females when creating a treatment plan involving exercise.

### **Conclusion**

In recent years, there has been an increased interest in mental health and mental health disorders. Individuals with mental health disorders are most often given treatments such as medications and therapy and are not given many other options. When properly implemented, exercise presents an alternative form of treatment that may be effective in treating mental health disorders and preventing the development of them.

Exercise has been shown to provide numerous health benefits, both physical and mental. Exercise can improve cardiovascular and musculoskeletal health, as well as reduce the symptoms of common mental health disorders. There is a growing body of research that supports the use of exercise in the treatment of mental health problems such as anxiety and mood disorders due to the impact it has on many of the body's physiological and biochemical mechanisms. Some of the ways in which major mechanisms are influenced by exercise include the improved function of monoamine neurotransmitters, elevated release of endorphins, enhanced mitochondrial function, increased mTOR signaling, enhanced regulation of the HPA axis, an increase in BDNF, and improved neurogenesis in the brain. These positive effects of exercise result in the improvement of different types of anxiety and mood disorders, including generalized anxiety, post-traumatic stress disorder, and major depression. According to substantial evidence, exercise can provide antidepressant effects, reduced feelings of anxiety and stress, and improved self-efficacy and self-esteem.

When considering the implementation of exercise as part of a treatment plan for individuals with mental health disorders, there are several considerations that providers should be mindful of. Hence, a multidisciplinary approach should be taken in order to ensure the best possible initiation and maintenance of an exercise program. Providers should consider factors including patients' varying comfort levels with social settings such as fitness centers, the fitness level of their patients and their preferred form of exercise, and whether or not their patient has a problem with addictions as this could increase the risk for developing an exercise addiction. By keeping these considerations in mind, providers will be able to create a more enjoyable and sustainable experience for their patients who are engaging in exercise as treatment for a mental health disorder.

Finally, it is important to be aware of the limitations of this research. Limitations that have been identified include the differences in the effectiveness of exercise for certain types of mental health disorders, how the benefits of different forms of exercise compare to each other, and the difference in the way exercise impacts males and females. Keeping these current limitations in mind will be useful when moving forward with further research regarding the impact of exercise on mental health.

Overall, this research is significant because the number of people being diagnosed with mental health disorders is increasing in the United States, as well as throughout the rest of the world. The number of undiagnosed but existing instances of people suffering from high levels of stress is also on the rise. While there are some treatments currently available for mental health disorders, exercise provides an excellent option that is both economical and sustainable. This research is also significant because it can be used to encourage additional exploration of the issue, as well as increase awareness. Furthermore, it has significance because it has the potential

to be used as personal intervention, and practically applied in a clinical setting, increasing the ability of providers to treat patients that suffer from stress and mental health disorders. Overall, through the impact that exercise has the various physiological and biochemical mechanisms, exercise can be used to treat mental health problems such as stress and anxiety and mood disorders, as well as prevent them from developing.



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