International Journal of Research Publication and Reviews, Vol 6, Issue 5, pp 17979-17985 May 2025

WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Role of Exercise as an Adjunctive Therapy in the Management of Depression : A Review of Clinical Evidence

Ms.Sakshi.R.Bhalerao[1*], Mr.Vishal.S.Gaikwad[2*], Mr.Abhijit .R.Rode[3*]

[1]Student ,Pratibhatai pawar college of pharmacy, Shrirampur

[2]Asst.Professor ,M.Pharm in Pharmaceutics, Pratibhatai Pawar college of pharmacy, Shrirampur \

Email :sakshibhalerao485@gmail.com, Contact No:9096154135

Abstract :

Depression is one of the main causes of disability around the world and has been for many years. Medicines used to treat depression don't always work well and often cause unwanted side effects. That's why it's important to find other ways to help people with depression. Exercise is well known for helping the body, but it also has benefits for mental health. Studies show that exercise can help reduce symptoms of depression. However, scientists are still not sure exactly how exercise helps the brain.

Some research shows that short periods of exercise can change the levels of brain chemicals like serotonin and norepinephrine, and also affect the immune system. But regular exercise doesn't always show the same changes, and there's not enough proof to clearly connect these changes to feeling less depressed.

Depression is a complex illness, and how exercise affects the body is also complicated. This makes it hard for researchers to fully understand how exercise works to improve mental health.

Even though we don't know everything about how it works, there is strong proof that exercise helps treat depression. Sadly, it's still not used enough, even though it's a low-cost and easy option that can also improve overall health.

To better understand how exercise helps with depression, experts suggest using new scientific methods and teamwork between different fields of research, along with big investments in public health. Without these steps, it will be hard to improve treatments and create clear guidelines for using exercise in mental health care.

Keywords : depression ,symptoms, exercise, physical activity,Adjunction therapy, Antidepressants,

Introduction :

Depression and anxiety are the most common mental health problems that doctors see in regular medicalclinics[1].Around340million peopleall over the world suffer fromdepression[2].Depression is the main reason people around the world become disabled and can't do daily activities. By the year 2020, it was expected to become the second biggest health problem in the world[3].Depression is a very common mental health problem that affects 340 million people around the world, no matter their age, gender, or background. It was expected to become the main cause of disability and the second biggest health problem in the world by 2020 [4,5].Current research shows that by the age of 14 [6], about 9 out of every 100 children have gone through at least one serious period of depression. Also, as many as 10 out of every 100 teenagers may have a major depressive disorder[7].People with depression often feel very sad, lose interest in things they used to enjoy, and may have trouble eating or sleeping. They might feel bad about themselves, have trouble focusing, and feel tired all the time. These problems can last a long time and sometimes become so serious that the person may not be able to live a normal life—or may even try to harm themselves[4].Recent reports say that doctors can find out if someone has depression, and it can be treated. Medicine and talking to a therapist can help most people— about 60 to 80 out of 100 feel better with treatment[8].Only 10–25% of people with depression get treatment. This is often because there aren't enough resources or trained professionals, or because people feel ashamed due to the stigma around mental health[4].That's why it's very important to find other ways to treat depression. Some promising studies show that exercise and physical activity can help reduce depression symptoms, sometimes as much as antidepressant medicine[9, 10].

Depression causes people to feel sad most of the time and lose interest in activities they once enjoyed. It can also affect their eating and sleeping habits, lower their self-esteem, and make them feel guilty and tired. They may find it hard to concentrate. If these symptoms continue, they can cause long-term problems like disability or even lead to suicide attempts [4].Recent reports show that depression can be reliably found by primary care doctors. It can be successfully treated with medicine and therapy, with 60–80% of people getting better. However, only 10–25% of people with depression get treatment. This is often because there aren't enough resources or trained doctors, or because people feel ashamed due to the stigma around depression[8].That's

why it's very important to find new ways to treat depression. Good news is, studies show that exercise and physical activity can help reduce depression symptoms. In fact, they can work just as well as antidepressant medicines [9].

There are many ways to treat depression and anxiety, but how well they work can be different. Even though there are more medicine options now than 20 years ago, many people still don't get better with the first antidepressant they try. In fact, 15% to 33% of people don't get better even after trying several treatments . Also, medicines for depression and anxiety can be expensive and often cause serious side effects that can lower a person's quality of life[11].

Physical activity and exercise are often suggested to help prevent and treat many diseases. Regular exercise can stop heart disease from developing and can also help people who already have heart problems. There is also strong evidence that exercise lowers the risk of other long- term illnesses like type 2 diabetes, osteoporosis, obesity, and breast and colon cancer. Besides that, exercise is also recommended to help treat depression and anxiety[12].Early studies with large groups of people looked at how exercise and mental health are connected . One study checked the exercise habits and depression symptoms of 1,900 healthy people aged 25 to 77 between 1982 and 1984. It found that people who didn't exercise much were more likely to have symptoms of depression [13].

Unlike gender, a person's age might change how exercise affects their mental health. Exercise doesn't seem to help much with reducing anxiety in teenagers. But another study by Fox found that adults in Europe over 70 years old who were more active felt healthier and had a better quality of life, [14].In general, staying active seems to be good for mental health, while not being active is linked to a higher chance of developing mental health problems. Some studies have shown that people who don't exercisemuch are more likely to have symptoms of depression and anxiety [15].

Depression is a condition that can affect people in different ways, but it does have common signs. These include feeling sad or down all the time, losing interest in things you once enjoyed, feeling tired or low on energy, changes in eating and sleeping habits, feeling worthless or guilty, having trouble concentrating or making decisions, and thinking about death or suicide. These symptoms can make it hard for a person to function in their everyday life[16].Depression causes a lot of disability and suicide, especially in low- and middle-income countries. However, when looking at the size of the population, disability and suicide rates are similar in countries of all income levels. Because depression is common and can lead to long-term problems like disability, illness, and even death, there is a strong need to create new and effective treatments[17].Exercise is being studied more and more as a way to help with depression, and many studies show that it can improve symptoms of major depression. In other areas of health, research shows that regular exercise helps protect the heart, keeps weight healthy, reduces the risk of cancer, and helps control diabetes, high blood pressure, and other long-term conditions. In fact, exercise is often one of the first lifestyle changes recommended to improve health. Since depression is now seen as a long-term illness, it makes sense that lifestyle changes could also help manage

Possible neurophysiologic mechanisms

Physical activity and exercise can cause positive changes in the brain. Brain scans have shown that people with early depression often have changes in brain areas like the hippocampus, amygdala, striatum, and frontal cortex—areas that work closely together. One common finding in people with depression is that the hippocampus is smaller than normal. Higher levels of a brain chemical called BDNF (brain-derived neurotrophic factor) in the hippocampus are linked to lower anxiety[19].

People with depression often have a smaller part of the brain called the hippocampus. Taking antidepressant medicine can help the brain grow new cells. A group of researchers, led by Ernst, think that exercise can also help reduce depression by helping the brain grow new cells. They say this happens because exercise increases four helpful chemicals in the brain: beta-endorphins, VEGF, BDNF, and serotonin. These chemicals help the brain grow and feel better[20].

Exercise can boost your mood in a few ways. It increases natural chemicals called endocannabinoids that help you feel less pain, less stress, and more happiness. Exercise also changes how your body handles stress—it raises a hormone called ACTH and lowers another one called cortisol. These changes help you feel better. Also, exercise can help people with depression feel better about themselves, which can help reduce their sadness[21].

Exercise, physical activity and depression

People have known for a long time that exercise and being active can help lower depression.An old study by Paffenbarger and his team looked at 31,000 Harvard graduates in the years 1962, 1966, 1977, and 1988. They found that people who were more active felt less depressed than those who didn't exercise.A newer study looked at 5,877 people aged 15 to 54 and found the same thing. People who exercised had lower levels of depression than those who didn't.The study also showed that the more often people exercised, the better they felt. People whoexercised a lot had the least depression, people who exercised sometimes had more depression, and people who didn't exercise at all had the most depression[22].

Exercise and being active help people feel better and less depressed, no matter their age.In children and teenagers, exercise has been shown to help a little with lowering depression and anxiety. But there aren't many studies on this, and the results are different because the people and methods used in the studies vary a lot. So, it's hard to make strong conclusions.For young adults, one study looked at students and found that their mood was better on days when they exercised. It also found that being active and exercising often were closely linked to feeling good.Another study showed that exercise helped improve mood in people who don't usually exercise, in those who exercise for fun, and in marathon runners. In fact, for people who exercise for fun and marathon runners, exercise helped their mood in two ways, making them feel even better[23].

In older adults, exercise has shown very good results in helping reduce major depression.One recent study looked at older people with depression and found that being physically active helped lower their depression levels. Based on this, experts believe that exercise can be especially helpful for older people who have health problems or are going through tough times in life.Also, older people who keep being active over time tend to have fewer symptoms of depression than those who stop being active as they age[24].

Treatment of depression with exercise and physical activity

A recent study that looked at many other studies found that exercise has a strong positive effect on reducing depression in both men and women.Aerobic exercise (like running or swimming) helped a moderate amount, while strength training and mixed types of exercise helped even more.Also, exercise worked just as well as other common treatments for depression, like therapy or medication[25].

Research has clearly shown that exercise helps reduce symptoms of depression.For example, a recent study found that people with major depression who did aerobic exercise—either at home or in a group—felt better, just like those who took antidepressant medicine (sertraline). In fact, they felt even better than people who took a fake treatment (placebo).Interestingly, one study found that people with major depression who followed an aerobic exercise program were just as likely to get better as those taking antidepressant medicine (sertraline), or those doing both exercise and medication.Another study showed that doing aerobic exercise for 4 months helped reduce depression more than a fake treatment (placebo) or medicine.Similarly, a newer study found that an 8-month exercise program helped women aged 40–60 with depression feel better, while medicine alone did not help as much[26].

Even though exercise can help with depression, doctors don't usually suggest it as the main treatment. The American Psychiatric Association says exercise can be helpful, but it's not the first thing they recommend. Another group also says exercise should be used along with medicine or therapy, not instead of them[27].

Many studies show that exercise can help treat depression. One large review looked at 25 studies where people were randomly put into exercise or control (non-exercise) groups. It found that people who exercised felt less depressed than those who didn't. But only three of those studies were done very carefully. When only those three were looked at, the difference was not strong enough to be sure exercise helped[28].

Exercise can work just as well as antidepressant medicine for people with mild to moderate depression. In one study, Blumenthal gave 156 older adults either exercise, medicine, or both. After 4 months, everyone felt better, and there wasn't a big difference between the groups. The people taking medicine felt better a little faster in the first month. In another study, he found that about 45% of people who exercised with help, 40% who exercised at home, and 47% who took medicine felt better. About 31% of people who got no real treatment (placebo) also felt better. But the difference between the groups was not strong enough to prove one worked better than the others[29].

Exercise can also help improve depression when used along with medicine. In one study, older patients with depression who didn't get better after 6 weeks of taking medicine felt better when exercise was added. However, when exercise was combined with cognitive therapy (a type of talking therapy), it didn't work better than either exercise or therapy alone[30].We still need more research to know which type of exercise is best for treating depression. But current studies show that how hard you exercise matters more than the type of exercise you do. For example, both running and weight lifting helped reduce depression, and there was no big difference between them in how well they worked[31].

Treatment of anxiety with exercise and physical activity

There is a lot of research on how exercise helps with depression, but less research has been done on anxiety. Still, studies show that aerobic exercise (like running or biking) can be a helpful and low-cost way to treat different types of anxiety. Some studies even say it works as well as therapy (like cognitive behavioral therapy) for treating general anxiety[32].

Exercise can help lower feelings of anxiety. Doing aerobic exercise (like running or biking) at 70%–90% of your maximum heart rate for 20 minutes, three times a week, can make people less sensitive to anxiety. After following an exercise plan, people say they feel less scared of anxiety symptoms like fast breathing, a racing heart, and nervous behavior. In one study, the biggest drop in anxiety happened about 90 minutes after people did 20 minutes of exercise at a high level[33].

Exercise can help with anxiety, but it doesn't reduce anxiety as much as medication does. In one study, people with moderate to severe panic disorder improved after 10 weeks of regular aerobic exercise or taking a medicine called clomipramine. Both helped more than doing nothing (placebo), but the medicine worked better and helped people feel better faster than exercidid[34].

Overall, exercise seems to help reduce anxiety symptoms. It can help after just one workout and also when done regularly over time.

Exercise and physical activity are effective in managing depression symptoms. Benefits include:

Benefits of Exercise for Depression

1. Endorphin release: Natural mood-boosters.
2. Reduced symptoms: Regular exercise can decrease depressive symptoms.
3. Improved sleep: Exercise enhances sleep quality.
4. Increased self-esteem: Physical activity boosts confidence.
5. Social benefits: Group exercises or sports can provide social support.

Types of Exercise for Depression

1. Aerobic exercise: Running, cycling, swimming.
2. Yoga: Combines physical movement with mindfulness.
3. Strength training: Weightlifting, resistance exercises.
4. Outdoor activities: Walking, hiking, gardening.

Tips for Starting an Exercise Routine for Depression

1. Start small: Begin with short, manageable sessions.
2. Find enjoyable activities: Engage in exercises that bring joy.
3. Schedule it: Make exercise a regular part of routine.
4. Seek support: Exercise with friends, family, or a therapist.

Additional Considerations

1. Consult a healthcare provider: Before starting a new exercise routine.
2. Combine with therapy: Exercise can complement traditional treatments[35].

Here are some additional details on exercise and depression: Exercise Benefits for Depression

1. Neuroplasticity: Exercise promotes brain adaptability and growth.
2. Mood stabilization: Regular physical activity can help regulate mood.
3. Reduced inflammation: Exercise has anti-inflammatory effects.

Exercise Recommendations

1. Frequency: Aim for 3-4 times per week.
2. Duration: Start with 20-30 minutes per session.
3. Intensity: Moderate-intensity exercises (e.g., brisk walking).

Popular Exercises for Depression

1. Walking: Accessible and low-impact.
2. Yoga: Combines physical movement with mindfulness.
3. Swimming: Low-impact and relaxing.

Tips for Consistency

1. Find a workout buddy: Social support enhances motivation.
2. Track progress: Monitor exercise routine and mood.
3. Mix it up: Vary exercises to avoid boredom.

Additional Resources

1. Mental health professionals: Consult with therapists or counselors.
2. Fitness experts: Work with trainers or fitness coaches[36].

Risk of physical activity and exercise

The Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine say that people should try to do at least 30 minutes of moderate physical activity on most, ideally all, days of the week. However, it's important to know that physical activity does come with some risks. The most common risk for adults is injury to muscles, bones, or joints. This risk is higher for people who are overweight, exercise a lot, or take part in intense activities like competitive sports. Also, doing intense physical activity can temporarily raise the risk of serious heart problems, like a heart attack or sudden heart failure, especially in people who already have known or hidden heart conditions[37].

Clinical Evidence:

Exercise as a Treatment for Depression

Major Depressive Disorder (MDD) is a long-term illness, so it's important to find treatments that work well and have few side effects. Research shows that people who are not very active tend to have worse mental health, so scientists are looking into how exercise might help treat depression.

Studies, including those from the authors' own team, have found that aerobic exercise (like walking, jogging, or cycling) can help reduce depression symptoms, though the effects are modest. Reviews and recent research suggest that exercise can work well either on its own or alongside other depression treatments.These studies have included different types of exercise programs, such as group walks or solo jogging, and have lasted between 6 and 16 weeks. Most of the research has looked at how exercise helps during the early stages of treating depression. We still don't know much about whether exercise helps prevent depression from coming back after treatment[38].

Biological Evidence for Antidepressant Effects of Exercise

Scientists believe exercise can help with depression because of how it affects the brain. Here are the main ideas:

1. **Exercise boosts brain chemicals:**

People with depression may have lower activity of certain brain chemicals like serotonin, dopamine, and norepinephrine. These chemicals help control mood. Exercise can increase the levels of these chemicals, similar to how antidepressant medications work.

2. **Exercise helps the brain grow new cells:**

In a part of the brain called the hippocampus (which helps with emotions and memory), exercise may help grow new brain cells. This process is called neurogenesis, and it's believed to be important for treating depression.

3. **Exercise increases helpful brain substances:**

Exercise raises levels of things like:

BDNF (helps brain cells grow)

VEGF (helps with blood flow and brain health) **Beta**-endorphins (make

you feel good) **Serotonin** (helps regulate mood)[39].

Properties of exercise stimulus

There are still some research problems that make it hard to say exactly what kind of exercise works best for treating depression.However, most studies show that doing exercise more often usually helps reduce depression more.One recent study looked at people who did aerobic exercise once a week and others who did it 3 to 5 times a week for 8 weeks. The group that exercised more often had better results and felt less depressed.Another study from Finland with 3,403 adults also showed that people who exercised more often felt less depressed and had better overall well-being[40].So far, research has not clearly shown that doing exercise for a longer time always leads to better results for depression. Some studies—but not all—say that more intense exercise can improve mood more. Also, combining aerobic and strength training seems to help more than combining aerobic and flexibility training.Other research shows that certain types of exercise, like dynamic or anaerobic (short bursts of high effort), may increase feel-good chemicals in the brain more than regular aerobic or strength exercises.Both personal (one-on-one) and group exercise programs seem to work equally well for helping with depression.Some studies also say that supervised exercise (where a trainer or coach helps) may be more effective than exercising alone. This could be because people with depression might lose motivation and stop exercising if they don't have support, as one study showed[41].

Exercise and physical activity for treating depression in diseased individuals

- Exercise can help reduce depression, even in people who have other health problems.
- Two studies found that people with high blood pressure who didn't normally exercise felt less depressed after starting an exercise program.
- Other research in people with heart disease showed that adding strong strength training to a regular heart rehab exercise program improved mood and reduced depression more than adding stretching exercises.
- Aerobic exercise also helped people feel less depressed and improved their quality of life after a heart attack.

- This means that exercise might not only help with depression and anxiety, but also lower the risk of dying from heart disease, obesity, or weak bones (osteoporosis) in people with heart problems.
- Interestingly, regular depression treatments like therapy or medicine don't seem to lower the risk of death in heart patients. So, exercise might help heart health in ways that go beyond just treating depression[42].
- Conclusion :

Exercise has emerged as a promising adjunctive therapy in the management of depression, supported by a growing body of clinical evidence. Numerous studies have demonstrated that regular physical activity can significantly reduce depressive symptoms, improve mood, and enhance overall quality of life. The therapeutic effects are thought to result from a combination of physiological mechanisms, such as increased endorphin levels and neurogenesis, as well as psychosocial factors, including improved self-esteem and social interaction. While exercise should not replace conventional treatments such as pharmacotherapy and psychotherapy, it offers a cost-effective, low-risk, and accessible strategy that can complement existing interventions. Future research should continue to explore the optimal type, intensity, and duration of exercise for various populations, ensuring individualized and sustainable treatment approaches.

Reference

1. Ormel, Johan, et al. "Common mental disorders and disability across cultures: results from the WHO Collaborative Study on Psychological Problems in General Health Care." Jama 272.22 (1994): 1741-1748.
2. Greden, John F. "The burden of recurrent depression: causes, consequences, and future prospects." Journal of Clinical Psychiatry 62 (2001): 5-9.
3. Lopez, Alan D., and Christopher CJL Murray. "The global burden of disease, 1990– 2020." Nature medicine 4.11 (1998): 1241-1243.

4. Murray, C. J. L. "A Comprehensive Assessment of Mortality and Disability from Diesease, Injuries and Risk factors in 1990 and projected to 2020." The global burden of disease 1 (1994).
5. Kruijshaar, Michelle E., et al. "Has the burden of depression been overestimated?." Bulletin of the World Health Organization 83.6 (2005): 443-448.
6. Lewinsohn, Peter M., et al. "Age-cohort changes in the lifetime occurrence of depression and other mental disorders." Journal of abnormal psychology 102.1 (1993): 110.
7. Quijada, R. Escriba, et al. "Depression prevalence in adolescents." Actas Españolas De Psiquiatría 33.5 (2005): 298-302.
8. Möller, Hans-Jürgen, and Verena Henkel. "What are the most effective diagnostic and therapeutic strategies for the management of depression in specialist care?." What are the most effective diagnostic and therapeutic strategies for the management of depression in specialist care?. 2005.
9. Babyak, Michael, et al. "Exercise treatment for major depression: maintenance of therapeutic benefit at 10 months." Biopsychosocial Science and Medicine 62.5 (2000): 633-638.
10. Blumenthal, James A., et al. "Exercise and pharmacotherapy in the treatment of major depressive disorder." Psychosomatic medicine 69.7 (2007): 587-596.
11. Berlim, Marcelo T., Marcelo P. Fleck, and Gustavo Turecki. "Current trends in the assessment and somatic treatment of resistant/refractory major depression: an overview." Annals of medicine 40.2 (2008): 149-159.
12. American College of Sports Medicine, et al. "Exercise and acute cardiovascular events: placing the risks into perspective: a scientific statement from the American Heart Association Council on Nutrition, Physical Activity, and Metabolism and the Council on Clinical Cardiology." Circulation 115.17 (2007): 2358-2368.
13. Mary E., et al. "Physical activity and depressive symptoms: the NHANES I Epidemiologic Follow-up Study." American journal of epidemiology 128.6 (1988): 1340- 1351.
14. Fox, Kenneth R., et al. "Physical activity and mental well-being in older people participating in the Better Ageing Project." European journal of applied physiology 100 (2007): 591-602.
15. Ströhle, Andreas. "Physical activity, exercise, depression and anxiety disorders." Journal of neural transmission 116 (2009): 777-784.
16. Arlington, V. A. "DSM-5 Task Force. Diagnostic and statistical manual of mental disorders: DSM-5." (No Title) 44 (2013): 947.
17. World Health Organization. "Depression and other common mental disorders: global health estimates." (2017).
18. LaMonte, Michael J., Steven N. Blair, and Timothy S. Church. "Physical activity and diabetes prevention." Journal of applied physiology 99.3 (2005): 1205-1213.
19. Bjørnebekk, Astrid, Aleksander A. Mathé, and Stefan Brené. "The antidepressant effect of running is associated with increased hippocampal cell proliferation." International Journal of Neuropsychopharmacology 8.3 (2005): 357-368.
20. Ernst, Carl, et al. "Antidepressant effects of exercise: evidence for an adult-neurogenesis hypothesis?." Journal of Psychiatry and Neuroscience 31.2 (2006): 84-92.
21. Ossip-Klein, Deborah J., et al. "Effects of running or weight lifting on self-concept in clinically depressed women." Journal of consulting and clinical psychology 57.1 (1989): 158.
22. Goodwin, Renee D. "Association between physical activity and mental disorders among adults in the United States." Preventive medicine 36.6 (2003): 698-703.
23. Hoffman, Martin D., and Debi Rufi Hoffman. "Exercisers achieve greater acute exercise- induced mood enhancement than nonexercisers." Archives of physical medicine and rehabilitation 89.2 (2008): 358-363.
24. Harris, Alex HS, Ruth Cronkite, and Rudolf Moos. "Physical activity, exercise coping, and depression in a 10-year cohort study of depressed patients." Journal of affective disorders 93.1-3 (2006): 79-85.
25. Daley, Amanda, and Kate Jolly. "Exercise to treat depression." Bmj 344 (2012).
26. Carta, Mauro Giovanni, et al. "Improving physical quality of life with group physical activity in the adjunctive treatment of major depressive disorder." Clinical Practice and Epidemiology in Mental Health 4 (2008): 1-6.
27. .Kaiser Permanente Medical Care Program. Care Management Institute. Clinical practice guidelines for the management of depression in primary care [monograph on the Intranet]. Oakland, CA: Kaiser Permanente Medical Care Program, Care Management Institute; 2006. from:http://cl.kp.org/pkc/national/cmi/programs/depression/guideline/index.html
28. Mead, Gillian E., et al. "Exercise for depression." Cochrane database of systematic reviews 4 (2008).
29. Blumenthal, James A., et al. "Exercise and pharmacotherapy in the treatment of major depressive disorder." Psychosomatic medicine 69.7 (2007): 587-596.
30. Fremont, Jeffrey, and Linda Wilcoxon Craighead. "Aerobic exercise and cognitive therapy in the treatment of dysphoric moods." Cognitive therapy and Research 11 (1987): 241-251.
31. Doyne, Elizabeth J., et al. "Running versus weight lifting in the treatment of depression." Journal of consulting and clinical psychology 55.5 (1987): 748.
32. McEntee, Derek J., and Richard P. Halgin. "Cognitive group therapy and aerobic exercise in the treatment of anxiety." Journal of College Student Psychotherapy 13.3 (1999): 37- 55.
33. Cox, Richard H., et al. "Effects of acute 60 and 80% VO2max bouts of aerobic exercise on state anxiety of women of different age groups across time." Research Quarterly for Exercise and Sport 75.2 (2004): 165-175.
34. Broocks, Andreas, et al. "Comparison of aerobic exercise, clomipramine, and placebo in the treatment of panic disorder." American Journal of Psychiatry 155.5 (1998): 603-609.

35. Wayne, Peter M., et al. "The Science of Tai Chi and Qigong and Whole Person Health Part I: Rationale and State of the Science." Journal of Integrative and Complementary Medicine (2025).
36. Barton, Jo, and Jules Pretty. "What is the best dose of nature and green exercise for improving mental health? A multi-study analysis." Environmental science & technology
37. 44.10 (2010): 3947-3955.
38. Hootman, Jennifer M., et al. "Epidemiology of musculoskeletal injuries among sedentary and physically active adults." Medicine and science in sports and exercise 34.5 (2002): 838-844.
39. Lawlor, Debbie A., and Stephen W. Hopker. "The effectiveness of exercise as an intervention in the management of depression: systematic review and meta-regression analysis of randomised controlled trials." Bmj 322.7289 (2001): 763.
40. Ernst, Carl, et al. "Antidepressant effects of exercise: evidence for an adult-neurogenesis hypothesis?." Journal of Psychiatry and Neuroscience 31.2 (2006): 84-92.
41. Hassmen, Peter, Nathalie Koivula, and Antti Uutela. "Physical exercise and psychological well-being: a population study in Finland." Preventive medicine 30.1 (2000): 17-25.
42. Krawczynski, Marcin, and Henryk Olszewski. "Psychological well-being associated with a physical activity programme for persons over 60 years old." Psychology of sport and exercise 1.1 (2000): 57-63.
43. Milani, Richard V., Carl J. Lavie, and Mark M. Cassidy. "Effects of cardiac rehabilitation and exercise training programs on depression in patients after major coronary events." American heart journal 132.4 (1996): 726-732.