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# Potential effects of physical activity in treatment of depression and anxiety

Bachelor's project in Bachelor thesis in Human Movement Science  
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## **Abstrakt**

**Bakgrunn:** Depresjon er ansett for å være den mest vanlige mentale sykdommen på verdensbasis, hvor WHO rapporterer at over 264 millioner personer lider av en form for depresjon. Formålet med denne rapporten er å se på mulig behandlingseffekt fysisk aktivitet har på depresjon og angst. **Metode:** Studiene ble funnet via databasen Pubmed. Studiene som ble inkludert var enten randomized control trial, clinical trials eller systematic reviews. Studiene er nyere enn 10 år og omhandler effekten av fysisk aktivitet, hvor de som også inkluderer bruk av medisin ble ekskludert. **Resultat:** Forskningen viser til en sammenheng mellom fysisk aktivitet, og depresjon/angst. Flere studier viser også til at individer med mer stillesittende tid i løpet av en dag, har høyere forekomst av depresjon og angst. Dette kan være en indikator på at fysisk aktivitet kan være en viktig komponent til å forebygge depresjon og angst. **Konklusjon:** Fysisk aktivitet kan være en potensiell behandlingsmetode både i seg selv, eller i kombinasjon med andre behandlingsmetoder for depresjon og angst.

**Nøkkelord:** Angst, Depresjon, Fysisk aktivitet, Stillesittende livsstil.

## **Abstract**

**Purpose:** Depression is considered to be the most common mental illness worldwide, with WHO reporting that over 264 million people suffer from some degree of depression on a worldwide scale. The goal of this report is to look into the potential treatment effects physical activity has on depression and anxiety **Methods:** The studies were found through the database PudMed. The studies that were included were either randomized control trials, clinical trials or systematic reviews. Studies were no older than 10 years and were focused on physical activity only, so those including medicinal usage were excluded. **Results:** The research shows a correlation between physical activity, and depression or anxiety. More studies also show that the individuals who have more sedentary time during their day, have a higher occurrence of depression and anxiety. This can be an indicator that physical activity can be an important component to prevent depression and anxiety. **Conclusion:** Physical activity can be a potential treatment method both on its own, and in conjunction with other treatment methods for depression and anxiety.

**Keywords:** Anxiety, Depression, Physical activity, Sedentary lifestyle

## **Introduction**

Depression is considered to be the most common mental illness worldwide, with WHO (world health organization) reporting that over 264 million people suffer from some degree of depression on a worldwide scale (1). Depression (major depressive disorder) is a common and serious medical illness that negatively affects how you feel, the way you think and how you act. Fortunately, it is also treatable. Depression causes feelings of sadness and/or a loss of interest in activities you once enjoyed. It can lead to a variety of emotional and physical problems and can decrease your ability to function at work and at home (2).

Anxiety is an emotion characterized by feelings of tension, worried thoughts and physical changes like increased blood pressure (3). There are several kinds of anxiety disorders, the most common ones are generalized anxiety disorder, panic disorder and phobia-related disorders (4). Anxiety disorders are generally treated with psychotherapy, medication, or both. There are many ways to treat anxiety and people should work with their doctor to choose the treatment that is best for them.

WHO defines physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure. Physical activity refers to all movement including during leisure time, for transport to get to and from places, or as part of a person's work. Both moderate- and vigorous-intensity physical activity improve health. Popular ways to be active include walking, cycling, wheeling, sports, active recreation and play, and can be done at any level of skill and for enjoyment by everybody (5). Physical activity (PA) has been central in the life of our species for most of its history, and thus shaped our physiology during evolution. However, only recently the health consequences of a sedentary lifestyle, and of highly energetic diets, are becoming clear (6).

From the current knowledge, it's strongly suggested that physical activity can have positive effects for individuals suffering from depression. Depression and anxiety are the most common psychiatric conditions seen in the general medical setting. Physical activity has been shown to be associated with decreased symptoms of depression and anxiety. Exercise compares favorably to antidepressant medications as a first-line treatment for mild to moderate depression and has also been shown to improve depressive symptoms when used as an adjunct to medications (7).

In addition to an improvement of body fitness and learning and memory skills, it is well documented that PA can induce changes in the mental status, reducing anxiety and producing a general sense of wellbeing (8). Exercise can help relieve symptoms of depression in several ways. Among other benefits, it helps stimulate the release of feel-good brain chemicals. For example, regular exercise can positively impact serotonin levels in your brain. Raising your levels of serotonin boosts your mood and overall sense of well-being. It can also help improve your appetite and sleep cycles, which are often negatively affected by depression (9).

Common mental health disorders are responsible for the largest proportion of the global burden of disease; yet, there is sound evidence that these disorders, as well as severe mental disorders, can be successfully treated (10). Physical activity can treat and prevent depressive symptoms, but its antidepressant mechanisms are yet to be established. Therefore the main purpose of this study will be to determine why physical activity can be used as a treatment method for patients with depression and anxiety.

## Method

The literature search completed for report was collected from PubMed. Most common search words used were “Physical activity” “depression” “physical activity preventing depression” and “sedentary behaviour depression.” The search words were used in combination with each other to narrow down the search. The available articles were reviewed and filtered out then handpicked one by one, to find the most accurate for the research question, There was a total of 8 articles picked as the primary base for this report.

Inclusion and exclusion criterias can be seen in table 1 below. These criterias were set to limit the amount of research articles used in this report.. There was a total of 8 main studies and 11 supportive ones used in this report. The main article type is RCT’s (randomized control trials) with some clinical trials and systematic reviews also being used as primary articles. Meta-analysis has been excluded since it often can have increased bias. The studies chosen are also only the newer ones, the limit has been put to a 10 year period. There can still be a lot of highly relevant studies from previous years, but based on the huge amount of articles on this topic, a limit was set to narrow down the search. The studies also had its results based only on physical activity, excluding studies where it was combined with medicinal usage, since it doesn’t fit with the main purpose.

*Table 1: Inclusion and Exclusion criterias.*

<b>Inclusion criterias:</b>	<b>Exclusion criterias:</b>
Randomized control trials, Clinical trial, Systematic review (cross sectional studies)	Meta-Analysis
Newer than 10 years old	Older than 10 years old
Only the effect of the physical activity	effects of possible medication

## **Results**

The eight primary studies with a total of 1089 participants that's included in this report are focused on the effects physical activity has on depression and/or anxiety. To cover if physical activity can have similar effects across different age groups, there are both studies on younger and elderly populations to compare the results on patients in different stages of their life. The primary studies include a mix of RCT's, systematic reviews, observational and cross-sectional studies as shown in table 2. The studies also include different variants of physical activity to see if certain intensity levels of physical activity shows a different outcome.

*Table 2: Primary studies used in this report.*

<b>Study</b>	<b>Study Design</b>	<b>Population</b>	<b>Year</b>	<b>Source</b>
The effects of physical activity on anxiety, depression, and quality of life in elderly people living in the community	Cross-sectional study, questionnaire systemic review	200 elderly	2019	<a href="http://www.scielo.br/scielo.php?script=sci_arttext&amp;pid=S2237-60892019000100005&amp;tlng=en#B26">http://www.scielo.br/scielo.php?script=sci_arttext&amp;pid=S2237-60892019000100005&amp;tlng=en#B26</a>
Physical activity and exercise as a universal depression prevention in young people	Narrative review of 11 studies) Systematic reviews, randomized control trials (RCTs) and controlled clinical trials were all included.		2018	<a href="https://pubmed.ncbi.nlm.nih.gov/30302925/">https://pubmed.ncbi.nlm.nih.gov/30302925/</a>
Physical activity and sedentary lifestyle in university students: changes during confinement due to the COVID-19 pandemic	Observational, cross-sectional, pre-post study, systemic review	185 young adults and students	2020	<a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7558021/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7558021/</a>
Experimentally investigating the joint effects of physical activity and sedentary behavior on depression and anxiety	Randomized controlled trial	57	2018	<a href="https://pubmed.ncbi.nlm.nih.gov/30029153/">https://pubmed.ncbi.nlm.nih.gov/30029153/</a>

Effect of university students' sedentary behavior on stress, anxiety and depression	cross-sectional study, questionnaire	244 students	2018	<a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7818186/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7818186/</a>
The Level of Anxiety and Depression in Dialysis Patients Undertaking Regular Physical Exercise Training--a Preliminary Study	Personal questionnaire, Beck Depression Inventory (BDI) and State-Trait Anxiety Inventory (STAI)	28	2016	<a href="https://pubmed.ncbi.nlm.nih.gov/26872253/">https://pubmed.ncbi.nlm.nih.gov/26872253/</a>
Effectiveness of physical exercise in the treatment of depression in older adults as an alternative to antidepressant drugs in primary care	RCT	312	2019	<a href="https://pubmed.ncbi.nlm.nih.gov/30642326/">https://pubmed.ncbi.nlm.nih.gov/30642326/</a>
Pilates and aerobic training improve levels of depression, anxiety and quality of life in overweight and obese individuals	RCT	63	2017	<a href="https://pubmed.ncbi.nlm.nih.gov/29236887/">https://pubmed.ncbi.nlm.nih.gov/29236887/</a>

In a 2018 study conducted by Blough and Loprinzi, They investigated the joint effects of physical activity and sedentary behavior on depression and anxiety. The experiment was successful in altering physical activity levels among the intervention groups and maintaining habits in the control group. Anxiety and depression symptomology remained constant across the two time periods in the control group. For both intervention groups, depression statistically significantly increased during the inactive week and then resumed back to baseline levels after a week of resumed activity (11).

To compare if different kinds of physical activity can give a positive effect on depression and anxiety, a 2017 study conducted by Vancini and colleagues looked at the effects of Pilates and aerobic training in overweight and obese individuals, to see if it could improve levels of depression, anxiety and quality of life. The scores of quality of life, depression and trait-anxiety improved in the Pilates and walking groups. State-anxiety levels improved only in the walking group. This study suggests that Pilates and walking can positively impact quality of life, depression and anxiety. It also suggests that the Pilates method could be used as an alternative to improve mood disorders in overweight/obese individuals (12).

To investigate the effectiveness of physical exercise in the treatment of depression in older adults as an alternative to antidepressant drugs in primary care, Hidalgo conducted a RCT study in 2019 involving a total of 312 patients over the age of 65 years old with clinically significant depression over a period of 6 months. The evidence currently available suggests that physical exercise can be beneficial for depressed patients and might compare to antidepressant treatment, but the best way of implementing this recommendation in clinical practice still remains unknown (13).

A study conducted in 2018 by Kandola and associates looked into the effects physical activity can have as a treatment method for anxiety. PA in the general population has established efficacy in preventing and managing cardiovascular disease and improving wellbeing. Recent epidemiological data further suggests that people who are more active may be less likely to have anxiety disorders. In addition, evidence from systematic reviews of randomised control trials suggests that exercise training, a subset of PA, can reduce symptoms in anxiety and stress-related disorders, such as post-traumatic stress disorder, agoraphobia and panic disorder (14).

In 2018 Pascoe and Parker did a review of 11 papers which were published between 1980 and 2017 relating to “Depressive Disorder” under the “Universal Prevention” illness stage and classified as “Physical activity/Exercise” under the treatment/intervention classification. The studies were either systematic reviews, RCT’s (Randomized control trials) or controlled clinical trials. The reviewed studies indicated that exercise and physical activity might be an effective universal depression prevention intervention for young people (15).

In this 2019 study (13), the researchers observed that the active group showed higher scores of physical activity and quality of life. Conversely, the sedentary group revealed higher scores of anxiety and depression. During the Covid-19 pandemic, there was a study done in 2020 to the changes in physical activity and sedentary lifestyle in college students. The study had a total of 213 health science students participate (16). This study showed the average daily increase in sitting time was 141,67 minutes. This shows a trend in increased sedentary lifestyle, which also showed less overall physical activity.

Another similar study looking at the effect of university students' sedentary behavior on stress, anxiety, and depression. Data were collected from 244 students using self-reported sitting time, the Perceived Stress Scale, the Beck Anxiety Inventory, and the Center for Epidemiological Studies-Depression Scale. The findings showed that the Mean sitting time was 7.96 h per day. As sitting hours increased, university students' stress, anxiety, and depression significantly increased despite controlling for sex, economic level, body mass index, underlying disease, and health self-management (17).

Anti-psychotic medication has emerged as the primary medical treatment for people with severe mental illness, despite the great risks involved in the use of this medication. In addition, this population suffers from problems of obesity, sedentary lifestyle and poor physical fitness, which are aggravated by the use of this type of medication (18). Several epidemiological studies have shown that exercise and physical activity can prevent or delay the onset of different mental disorders, and have therapeutic benefits when used as a sole or adjunct treatment in mental disorders (19).

## **Discussion**

Most research shows a correlation between increased levels of physical activity, and decreased levels of depression. While a more sedentary lifestyle seems to indicate a higher risk of mental illness connected to depression or anxiety. There has been strongly suggested that physical activity can have a preventive effects in both the younger and elderly patient groups, as shown in the 2019 RCT study conducted by Hidalgo on a elderly group, or in the 2019 study by Blanco and co which compared increased sedentary time with the increase in depression and anxiety among the younger population.

In the RCT study from 2018, Blough and Loprinzi investigated the joint effects of physical activity and sedentary behavior on depression and anxiety. They concluded that the symptomology remained constant across the two time periods in the control group regarding both anxiety and depression, while for both intervention groups, depression statistically significantly increased during the inactive week, and resumed back to baseline levels after a week of resumed activity (11). They did not observe a joint effect of sedentary behavior and exercise on changes in anxiety and depression. Their main findings in this study concludes that reducing habitual physical activity may cause an increase in depression symptomology among young active adults. These results suggest that decreasing the amount of habitual physical activity in young active adults, can potentially lead to an increased risk in strengthening their depression symptoms, which can also suggest that maintaining a proper level of physical activity can reduce the depressive symptoms in young adults.

The most common conception of physical activity is often thought of as either performing weight resistance training or cardiovascular training at a high intensity. Physical activity refers to any bodily movement produced by skeletal muscles that requires energy expenditure, so it's important to also consider the different kinds of physical activity that may have a positive impact on depression and anxiety, so one can tailor the usage of this as a treatment method to each individual patient. A RCT study conducted in 2017 by Vancini and colleagues looked at the effects of Pilates and aerobic training in obese individuals. The study wanted to research if these physical activities could improve levels of depression, anxiety and quality of life. The results showed improved scores in quality of life, depression and trait-anxiety in the Pilates and walking group. State-anxiety levels improved only in the walking group. The study suggests that Pilates and walking can positively impact the quality of life,

depression and anxiety. It also suggests that the Pilates method could be used as an alternative to improve mood disorders in overweight/obese individuals (12).

The results in this study is an indicator that the intensity of the physical activity performed by the subject doesn't have to be high, as long as there is some degree of physical activity present. This indication can be seen as quite positive since it makes it more achievable for patients with no prior active physical background, to perform physical activity and their own intensity, and still have a possibility of experiencing positive results in reduction of depression and anxiety symptoms. These findings can't be seen as a direct confirmation that physical activity can be a stand alone treatment method for depression or anxiety, but it strongly suggests that even lower levels of physical activity can have a positive effect on patients suffering from these mental illnesses, and it suggests that it can improve the patients quality of life feelings, which in itself can be part of the treatment.

There have been studies performed on older adults in primary care, which focused on physical exercise as an alternative to antidepressant drugs. Hidalgo conducted a RCT study in 2019 that involved a total of 312 patients over the age of 65 years old with clinically significant depression over a period of 6 months. This study declared its aim to provide solid scientific evidence on a therapeutic resource of physical activity, which has undeniable health benefits and can be applied to certain health problems, such as depressive disorders, which are of great magnitude and considerable socio economic relevance, and have a significant impact on the quality of life of older adults (13). There is also yet not clear which way of implementing this recommendation into clinical practice that would give the best results. Even if this study can't help define if physical activity could be a treatment method for this targeted group, the results from the RCT study shows quite promising results.

With depression being considered the most common mental illness worldwide (1), The topic of finding alternative treatment or prevention methods outside of standardized medical usage is becoming a topic of high importance for the majority of the world's population. There has been an increase in both mental illness and weight related illness over the last years, so looking into the effects of using physical activity as a treatment for mental illness, might also impact the issue of the growing obesity problem. There is a lot of research papers strongly supporting that these mental disorders can be treated, yet they remain to be the largest proportion of the global burden of disease (10). So the question is, Can physical activity in

itself be used as a treatment method on its own, and to what extent can it be used as a reliable treatment compared to medicinal and therapeutic treatment methods.

Physical activity has shown to improve the wellbeing of the individuals who perform it regularly, and the data suggests through systematic reviews of RCT studies that exercise training can reduce symptoms in anxiety and stress-related disorders, such as post-traumatic stress disorder, agoraphobia and panic disorder. Even though the research showed that physical activity could be a possible treatment method outside of the regular medications, given the combined anxiolytic and physical health benefits of increased activity, physical activity presents a promising additional treatment option for people with anxiety disorders. However, there remain key gaps in the literature regarding the mechanisms underlying the effects of physical activity, optimal physical activity protocols, methods of improving adherence and the importance of physical fitness (14).

There also seems to be an increase in occurrence of depression and anxiety when daily sedentary time is increased. In the study conducted by Romero-Blanco and co in 2019 (19), there was shown a connection between higher scores of physical activity and quality of life. The more sedentary group revealed higher scores of anxiety and depression. This supports the current assumption that physical activity can help prevent mental illness, but it still doesn't determine that it can be a treatment method once the depression or anxiety has already occurred. Similar results were found in a both studies conducted by Lee and Kim (16) and, López-Torres Hidalgo J (13).

Lee and Kims study collected data from 244 students using self-reported sitting time, the Perceived stress scale and the center for epidemiological studies-depression scale.. This study showed that the more sitting hours increased, the higher occurrence of stress, anxiety and depression were reported. This is a good indicator that lowering daily physical activity levels by increasing the sedentary time impacts the risk of developing anxiety and depression related issues, which is a important factor to consider when looking into what physical activity in itself can possible do as a treatment method for this. Controlling for sex, economic level, body mass index, underlying disease and health self-management still provided the same results as many other similar studies has leaned towards in the past.

The 2019 study by López-Torres Hidalgo J and co showed quite similar results, but has to be taken into account that this study was conducted during COVID-19 pandemic. The study primarily focused on the correlation between sedentary time and scores of anxiety and depression. While this study seemed to find a correlation between increased sedentary time, lower amounts of physical activity, and its effect on both quality of life, depression and anxiety, it's important to consider the circumstances that the study was conducted under. During the COVID-19 pandemic there is a lot of restriction which may prevent the possibilities for social interaction and the subjects' regular habits of performing a physical activity of their preference. One can't claim that the result of this study which showed increased signs of depression and anxiety, and feeling of a lower quality of life, is directly related to the lower amounts of physical activity. There is likely also a social aspect that comes strongly into play here, since a lot of people were more or less isolated from most social interactions during longer periods of time during the pandemic, which in itself may be one of the primary causes for the increased anxiety and depression. Even if one can't rely on the results alone in this study to support the claim that physical activity can be a valuable asset in treatment for depression and anxiety, it still shows similar findings to other studies done before the pandemic.

Even if Anti-psychotic medication has emerged as the primary medical treatment for people with severe mental illness, despite the great risks involved in the use of this medication, there is still promising research which suggests that this could possibly be reduced with the more frequent usage of physical activity as a treatment method due to its promising trends in the field. Several epidemiological studies have shown that exercise and physical activity can prevent or delay the onset of different mental disorders, and have therapeutic benefits when used as a sole or adjunct treatment in mental disorders (19). This supports the primary goal of this report, which is looking into the possibility of using physical activity as a treatment method for depression and anxiety. Even if more studies are needed to pinpoint the exact effect and the best way to implement it in a clinical setting, the research seems to be quite positive and should be utilized more in the upcoming years.

## **Conclusion**

After reviewing the studies included in this report, most literature points towards physical activity being a potent treatment method for depression and anxiety, either by itself or in combination with other treatment methods. There is still more research to be done on the subject to actually claim fully that it can be a stand alone treatment method, But the research strongly suggests that physical activity has a positive effect on patients of all age groups suffering from depression on anxiety.

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