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Awareness of Physical Activity as an Antidepressant Mechanism: A Literature Review

Kesadaran Aktivitas Fisik sebagai Mekanisme Antidepresi: Studi Literatur

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ABSTRACT

Background: According to WHO (World Health Organization), mental disorders such as depression affected 300 million people and became a leading cause of disability. Depression and anxiety were parts of mental illness that were very common in the Generation Z era and could have long-term impacts on human survival.

Objective: This research aimed to determine the effectiveness of physical activity as an antidepressant and quality of life improvement as an effort to build the 2045 Golden Generation.

Methods: This research was a descriptive literature review study using 10 articles that were reviewed according to criteria after searching and selection from several databases, namely Biomed, Pubmed, Google Scholar and Science Direct.

Results: The recommended physical activity for people with depression and anxiety was jogging with moderate and vigorous intensity twice a week, or other physical activities that required a minimum of 600 METs-minutes per week, with 150 minutes of moderate-intensity activity or more than 75 minutes of vigorous-intensity activity each week.

Conclusion: The implementation of physical activity was recommended because it could reduce symptoms of depression and anxiety, as well as improve quality of life.

Keywords: Physical Activity; Depression; Anxiety; Mental illness

ABSTRAK

Latar Belakang: *Menurut WHO (World Health Organization), gangguan mental seperti depresi telah mempengaruhi 300 juta orang dan menjadi penyebab utama kecacatan. Depresi dan kecemasan merupakan bagian dari mental illness yang sangat umum di era generasi Z dan dapat berdampak jangka panjang pada kelangsungan hidup manusia.*

Tujuan: *Penelitian ini bertujuan untuk mengetahui efektivitas aktivitas fisik sebagai antidepressant dan peningkatan kualitas hidup sebagai upaya membangun Generasi Emas 2045.*

Metode: *Penelitian ini merupakan studi literature review deskriptif menggunakan 10 artikel yang di-review sesuai kriteria setelah pencarian dan seleksi pada beberapa database yaitu Biomed, Pubmed, Google Scholar dan Science Direct*

Hasil: *Aktivitas fisik yang disarankan untuk orang yang mengalami depresi dan kecemasan adalah jogging dengan intensitas moderate dan kuat dua kali seminggu, atau aktivitas fisik lain yang membutuhkan minimal 600 METs-menit setiap minggu, dengan 150 menit aktivitas intensitas moderate atau lebih dari 75 menit aktivitas intensitas kuat setiap minggu.*

Kesimpulan: *Penerapan aktivitas fisik direkomendasikan karena mampu mengurangi gejala depresi dan kecemasan, serta meningkatkan kualitas hidup.*

Kata Kunci: *Aktivitas Fisik; Depresi; Kecemasan; Mental Illness*

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INTRODUCTION

The number of people suffering from depression and anxiety continued to increase as these issues were often ignored and considered unimportant by society (Li *et al.*, 2025). Society also tended to stigmatize individuals experiencing depression and anxiety (Pragholapati et al., 2021). Depression and anxiety were manifestations of mental health disorders (Blodgett, 2023). Good mental health was characterized by a person's ability to grow physically, mentally, spiritually, and socially, enabling them to cope with pressure, work productively, and contribute to their community (Oliveira, 2025). Meanwhile, impaired mental health manifested symptoms such as depression, anxiety, feelings of being out of control, and withdrawal from social environments (Pascoe et al., 2020).

According to the Ministry of Health, mental disorders were health conditions that affected thoughts, feelings, behavior, mood, or a combination of these conditions (SKI, 2023). These conditions could be episodic or chronic. Data from the Indonesian Health Survey (SKI) in 2023 showed that approximately 6.1 percent of Indonesia's population—equivalent to 11 million people—experienced emotional mental disorders with symptoms of depression and anxiety. In severe depression cases, there could be a desire to harm oneself or commit suicide (Sinha & Maiti, 2025). About 80-90% of suicide cases were caused by depression and anxiety (Nurhaeni et al., 2022). The World Health Organization (WHO) reported that depression had affected 300 million people and became a leading cause of disability. Although pharmacotherapy and psychotherapy were necessary for treating depression and anxiety, these approaches had limited impact on prevalence (Guerrera et al., 2020).

Physical activity was an alternative method for treating and preventing depression and anxiety conditions. Consistently, physical activity demonstrated antidepressant effects (Blodgett et al., 2023). Physical activity was defined as skeletal muscle movement that required energy (Xie et al., 2025; De Oliveira et al., 2019). People were recommended to engage in physical activity to increase strength and fitness with appropriate dosages. Research on the relationship between physical activity and depression and anxiety showed the importance of knowledge about physical activity to ensure mental health could be effectively addressed (Da Silva Candido et al., 2020; Denche-Zamorano et al., 2023). Although many studies proved the effectiveness of physical activity in reducing symptoms of depression and anxiety and improving quality of life, the appropriate dosage and exercise programs still needed to be studied more deeply (Endriyani et al., 2022; Figueira et al., 2023). With structured dosages and exercise programs, recommendations would be more optimal for reducing symptoms of depression, especially for individuals with clinical depression symptoms (Pascoe et al., 2020).

In Indonesia, the number of people with mental illnesses such as depression and anxiety increased significantly and had a major impact on quality of life in the Alpha generation era (SKI, 2023). This situation was exacerbated by low public awareness about the importance of physical activity as a method of prevention, treatment, and improving quality of life (Galán-Arroyo et al., 2022).

This research aimed to examine the effectiveness of physical activity as an antidepressant mechanism for depression and anxiety, improving quality of life, and determining effective dosages of physical activity. With structured dosages and exercise programs, it was expected that appropriate recommendations would be optimal in reducing symptoms of

depression and anxiety, thereby improving quality of life as an effort to build the 2045 Golden Generation. This aligned with the main objectives of the 2045 Golden Generation, namely creating healthy, active individuals who participated in sports activities, increasing awareness of the importance of physical health, developing skills and sportsmanship, and encouraging participation in various physical activities and sports.

MATERIALS AND METHODS

A. Research Design

The writing method used was a literature review with a search period from February to May 2024. This literature review used the simplified approach by Aveyard. The simplified approach is a thematic approach to summarize articles or journals found after the author conducted detailed extraction and synthesis of the literature.

The stages in the simplified approach method according to Aveyard included: (1) summarizing journals or articles as shown in table 1, (2) identifying themes—in this research, theme identification could be started directly by examining the results and conclusions sections of the research, then reviewed and paraphrased according to the author's language, (3) developing themes—in this stage, what needed to be done was combining data by classifying articles that had similar themes and findings, (4) conducting theme supervision—at this stage, similarities and differences between articles began to emerge that required special attention, it was important to ensure that the original articles were not lost to facilitate further investigation, and (5) handling themes that did not support because they were not in accordance with the research. Based on the critical assessment that had been carried out, this needed to be considered and reconsidered, both the advantages and disadvantages of each article.

B. Document Selection

Article searches were conducted through Google Scholar, Biomed, Pubmed, and Science Direct databases using the keywords "Depression OR Anxiety AND Antidepressant OR Quality of life AND Physical activity". The researchers found 82,752 journals. The research journals were then examined based on title and abstract, resulting in 26 journals with 82,726 journals included in the exclusion criteria. After further selection, 10 journals were obtained for data synthesis. All articles that did not meet the inclusion criteria were excluded. The data collection process used the PRISMA method (Preferred Reporting Items for Systematics Review and Meta Analysis).

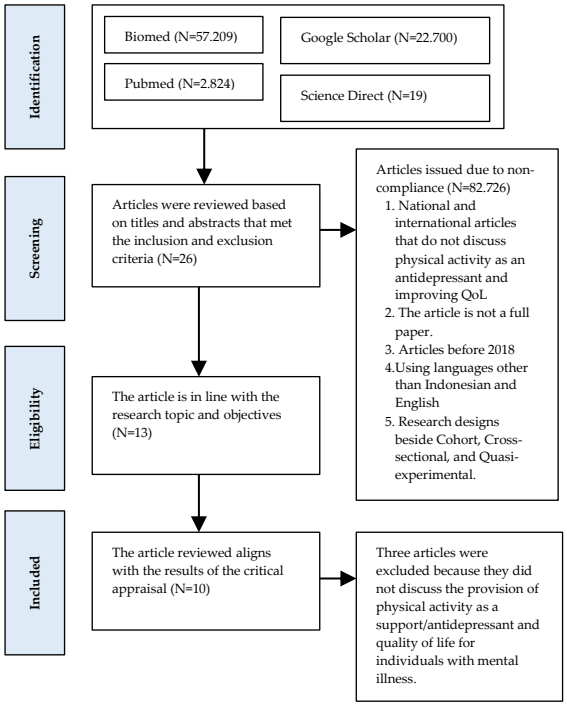

Figure 1. PRISMA Flow Diagram

C. Inclusion and Exclusion Criteria

The inclusion criteria in this study were: (1) Patients diagnosed with depression or anxiety in adolescents, adults, and the elderly, (2) Physical activity intervention, (3) physical activity as a support for antidepressant and quality of life improvement, (4) Study designs including cohort study, cross sectional study, and quasi experimental, (5)

Published between 2018 and 2024, (6) Using English and Indonesian languages. The exclusion criteria in this study were: (1) people who did not suffer from depression or anxiety, (2) Interventions performed were not physical activity, (3) Article results did not match the research topic, (4) Using study designs of systematic review, expert opinion, meta-analysis, and literature review, (5) Articles or journals published before 2018, (6) Languages other than English and Indonesian. The keywords used to search for articles were mapped using the PICO framework, with the following details:

1. **Population**, namely patients with depression or anxiety
2. **Intervention**, namely physical activity
3. **Comparisson**, which was not performed
4. **Outcome**, namely antidepressant/maintenance for depression and anxiety and improving quality of life.

D. Measurement Tools

In the assessment of physical activity as an antidepressant/maintenance for depression and anxiety as well as quality of life improvement, there were various parameters used in this study, such as WHOQOL-Old, PSS, HADS, ESSE, MET, IPA.

RESULT AND DISCUSSION

Table 1 was ten articles that met the criteria in this literature review had measurement tools such as WHOQOL-Old, PSS, HADS, ESSE, MET, and IPAQ for parameters of antidepressant treatment/depression in depression and anxiety as well as quality of life improvement (Li et al, 2025).

A. Physical Activity Mechanism as Antidepressant Mechanism

Patients with depression had lower neurotransmitter concentrations than the general population, including epinephrine, norepinephrine, serotonin, and dopamine (Guerrera et al., 2020). Physical activity was able to control neurotransmitter function (Cai et al, 2025). In addition, other explanations suggested that maintaining a state of physical activity could synthesize sufficient brain-derived neurotrophic factor (BDNF) to prevent depression and anxiety (Kim et al., 2019). BDNF was a hippocampal neurotrophic factor that protected nerve cells, synaptic plasticity, neurogenesis, and neuroregeneration; physical activity could increase BDNF levels for hippocampal growth and improve stress hormone regulation (Li et al., 2025). Insulin-like growth factor-1 (IGF-1) and growth hormone (GH) were other mechanisms through which antidepressants worked during exercise. The secretion of GH and IGF-1 could increase during physical activity, such as aerobic or strengthening exercises, thereby reducing symptoms of depression. This was because GH and IGF-1 were essential for the growth and function of the central nervous system, including cognition, mood, and sleep regulation (Li et al, 2025). Based on 10 reviewed journals, it was found that physical activity could reduce symptoms of depression and anxiety and improve quality of life. In the study by Figueira et al. (2023), 690 people aged between 55 and 65 years participated in physical activity for at least 150 minutes each week. This included aerobic exercise with moderate intensity each week, or 75 minutes of weekly exercise with high intensity, and at least twice a week weight training involving muscle groups. The results showed that physical activity had a significant relationship with anxiety, stress, and quality of life (Figueira et al., 2023).

This research was in line with the study by Galán-Arroyo et al., (2022) which involved physical activity with an intensity of 3-4 days/week, including 1-2 days of strength training; in this study, physical activity could reduce the prevalence of

depression. In each age group, the prevalence of depression experienced at any time in life was found to be related to the frequency of physical activity. In the general younger population, the prevalence of depression reached 3.2%. In inactive young people, the prevalence was found to be 2.1 percentage points higher than the average (5.3%), while the prevalence decreased to 1.3% in those who performed physical activity several times a month (Galán-Arroyo et al., 2022). In the elderly, the prevalence in inactive people was 19.8%, 10.6 percentage points higher compared to the elderly with physical activity several times a month (9.2%) (Galán-Arroyo et al., 2022).

Similar results were also found in Kim et al., (2019); in this study, it was found that the optimal amount of physical activity could reduce the onset of symptoms of depression and anxiety. Additionally, maintaining appropriate levels of physical activity for one year was beneficial for reducing risk factors for depression (Smith, & Merwin, 2021; Kirana et al., 2022). This study used MET as an outcome measure, so the physical activity performed had moderate-vigorous intensity, which was a minimum of <600 METs-min/wk with 150 minutes of moderate intensity activity, or more than 75 minutes of vigorous intensity physical activity per week (Kim et al., 2019).

In the study by Young et al., (2019), jogging physical activity with moderate and vigorous intensity twice a week with a total of 8 sessions, followed by 4 sessions of psychoeducation about nutrition and personal appearance, showed that the treatment group achieved more effective results than the control group in reducing symptoms of depression and anxiety and increasing self-esteem and social support (Young et al., 2019).

This journal was supported by research from De Oliveira et al., (2019) that routinely performed physical activities such as recreation and culture, dance classes, intellectually stimulating activities, craft activities, and group interactions. In addition, the active group showed higher scores on quality of life (Nurbasari et al., 2020). Conversely, the inactive group showed higher scores on anxiety and depression. According to the assessment data, there was a strong correlation between quality of life, mental health, and vitality levels (Antonucci, 2020; De Oliveira et al., 2019).

According to the 10 journals above, physical activity could be beneficial and was recommended because it could reduce symptoms of depression and anxiety and improve their quality of life.

B. Physical Activity Dose

Bélair M-A et al. 2018 revealed that adolescents who performed physical activity during leisure time less than one day per week had a higher risk of experiencing symptoms of depression and anxiety compared to those who were active at least one day per week. In other words, a minimum dose of physical activity one day per week already contributed to a reduction in the risk of these symptoms (Galán-Arroyo, et al., 2022). In another study, a high-intensity physical exercise program for 12 weeks could significantly reduce symptoms of depression in patients with major depressive disorder compared to the low-intensity exercise group (Schwefel et al., 2025; Wall et al., 2024). In addition, higher and structured physical activity was also associated with an increase in hippocampal volume, which played an important role in mood regulation and cognitive function (Philippot et al., 2022; Denche-Zamorano et al., 2023).

The application of physical activity doses for depression and anxiety, which was recommended, was jogging with moderate and vigorous intensity 2 times a week (Young et al., 2019). In another study, physical activity with a minimum of <600

METs-min/wk with 150 minutes of moderate intensity activity, or more than 75 minutes of vigorous intensity physical activity per week (Kim et al., 2019). This dose could be calculated using the formula: ((Number of METs)/(60 (Minutes))) ÷ Number of days.

Example: $\left(\frac{600}{60}\right) \div 2 = 5$ METs per day.

Physical activities such as recreation and culture, dance classes, intellectually stimulating activities, craft activities, and group interactions could also be options that could be implemented (Young et al., 2019). These physical activities could help people suffering from depression and anxiety and improve their quality of life.

Table 1. Results of the search

No	Title, Author, Year, Country	Sample. Age (Years)	Intervention	Result
1	Impact of Physical Activity on Anxiety, Depression, Stress and Quality of Life of the Older People in Brazil, (Figueira, et al., 2023), Brazil	690. 55-65	At least 150 minutes of aerobic exercise with moderate intensity weekly or 75 minutes of weekly exercise with high intensity and weight training involving muscle groups at least twice a week.	The sample consisted of 690 elderly individuals. Physical activity showed a high effect on quality of life (73%). The influence of physical activity on anxiety, stress, and depression showed Pearson's chi-square = 9.89, p value = 0.042, df = 4 and critical value = 9.49, so anxiety and stress have a significant relationship with physical activity. Therefore, physical activity in the elderly is recommended to address anxiety, stress, and improve quality of life.
2	Effects of Physical Activity Intervention for Chinese People With Severe Mental Illness, (Young, et al., 2019), China	94. 18-60	Jogging activity (moderate and vigorous) twice a week with a total of 8 sessions, followed by 4 psychoeducation sessions about nutrition and personal appearance.	The sample consisted of 94 participants divided into 2 groups: treatment group (52 people) and control group (42 people). The treatment group was more effective than the control group in reducing depression and increasing social support and self-esteem. P value <0.05 indicates statistical significance.
3	Physical Activity and Prevalence of Depression and*Antidepressants*in the Spanish Population, (Galán-Arroyo, et al.,2022), Spain	20,287. 18-84	The sample consisted of 20,287 participants. There is an inverse relationship between physical activity and the likelihood of suffering from depression and consuming antidepressants. Performing physical activity 3-4 days/week, including 1-2 days of strength training, can reduce the prevalence of depression in the	The sample consisted of 20,287 participants. There is an inverse relationship between physical activity and the likelihood of suffering from depression and consuming antidepressants. Performing physical activity 3-4 days/week, including 1-2 days of strength training, can reduce the prevalence of depression in the Spanish population. P value <0.001.

			Spanish population. P value <0.001.	
4	A Cross-Sectional Study on the Associations between Depression and Anxiety, Medication Use for These Diseases and Physical Activity Level in Spanish People with Hypertension, (Denche-Zamoranoet al., 2023), Spain	3,228. above 15	This study used physical activity level categories based on the PAI (Physical Activity Index) score developed from responses to items related to physical activity during a week, with a range from 0 to 67.5. The classification of physical activity levels is as follows: Inactive (PAI = 0), Walker (PAI = 0, but walking at least one day a week), Active (PAI = 1-30), and Very Active (PAI < 30)	Higher levels of physical activity are associated with a decreased risk of depression and anxiety as well as the use of psychotropic drugs among hypertensive adults in Spain. Individuals who are not active have a higher prevalence of depression and anxiety, as well as greater use of sedatives and antidepressants compared to those who are physically active. Women and individuals with low levels of physical activity are at higher risk for mental health problems and drug dependence. These findings affirm the importance of increasing physical activity levels to improve mental health and reduce drug dependence among adults with hypertension.
5	Physical Activity and the Prevention of Depression: A Cohort Study, (Kim, et al.,2019), Korea	119,069. 18-64	Minimal physical activity <600 METs-min/wk.	The sample consisted of 119,069 participants. In terms of one-year changes, there was a lower risk of the development of depressive symptoms in both sexes (men: HR, 0.81 [95% CI, 0.71-0.93]; women: HR, 0.84 [95% CI, 0.75-0.94]). Women in the adoption group showed a positive effect in terms of decreased incidence of depressive symptoms (HR, 0.87 [95% CI, 0.76-0.99]). P value <0.05 was considered statistically significant.
6	A Sport-for-Protection Program Reduces Anxiety and Depression in Youth Affected by Displacement: A Randomized Controlled Trial of the Game Connect Program in Uganda (Latimeret al., 2024), Uganda	834. 15-24	The duration of each physical activity session in this study was 2 hours	The results of this study show that a 16-week sport-for-protection program can significantly reduce symptoms of anxiety and depression in adolescents aged 15-24 years who are affected by displacement or from host communities. The reduction in these symptoms shows a large effect with an effect size (Cohen's d) of more than 1.2. These results are consistent in both participants who experienced displacement and those from host communities, as well as in males and females, and those with or without disabilities. The program proved effective as an independent mental health intervention as well as a complement, and was able to create a safe and supportive environment for participants.

7	Exercise and Health-Related Quality of Life and Work-Related Outcomes in Primary Care Patients with Anxiety Disorders – A Randomized Controlled Study, (Wall et al., 2024), Sweden	148. 18-65	This study involved a 12-week exercise program consisting of cardiovascular training and strength training with a frequency of 3 times per week, each for 45 minutes, for both low and high intensity exercise groups	The results of this study show that a 12-week high-intensity exercise program can improve health-related quality of life (HR-QoL) and work ability in patients with anxiety disorders. The benefits tend to persist up to 1 year after the intervention. The positive effects of exercise are stronger in participants who are taking antidepressants, suggesting a potential synergistic effect. Mediation analysis indicates that reducing symptoms of depression and anxiety as well as improving muscle strength contribute to improvements in quality of life and work ability. However, no significant changes were found in sick leave or presenteeism, and there are challenges related to participation rates and potential bias due to high dropout rates.
8	Impact of Physical Exercise on Depression and Anxiety in Adolescent Inpatients: A Randomized Controlled Trial, (Philippotet al.,2022), Belgium	52. 15	The dose of physical activity in this study was 20 sessions of 1 hour each, conducted three to four times a week for five to six weeks, for a total of approximately 20 hours of physical activity	Structured and supervised physical exercise programs provide significant benefits for adolescents experiencing depression and anxiety. Key findings include: a. Significant reduction in depressive symptoms, especially on the HADS-D scale, compared to the control group, accompanied by improved mood and cardiovascular fitness. b. The group that participated in physical exercise experienced increased VO_2 max, indicating improved cardiovascular health. c. This exercise program was also well-received, with high participation rates and was considered enjoyable. d. Despite some limitations such as small sample size and high dropout rates, these results support physical exercise as a beneficial addition to the treatment of depression in hospitalized adolescents.
9	Relationship Between Leisure Time Physical Activity, Sedentary Behaviour and Symptoms of	9,702. 14-15	This study does not specifically mention the dose of physical activity in terms of time or specific intensity, but rather classifies respondents as active or inactive	The results of this study show that in adolescents aged 14-15 years in Canada, physical activity during leisure time plays an important role in reducing the risk of moderate to severe symptoms of depression and anxiety. Adolescents who are not physically active have a higher likelihood of experiencing these symptoms.

	Depression and Anxiety: Evidence from a Population-Based Sample of Canadian Adolescents. (Bélair M-A, et al., 2018), Canada		based on their self-reports. The physical activity referred to is primarily physical activity sufficient to be categorized as "vigorous physical activity," although the details of the dose are not explained in detail in the available data	Sedentary behavior (sitting or non-movement time) is also associated with increased symptoms of depression and anxiety when viewed separately, but this relationship becomes less consistent when physical activity is considered together. This study affirms the importance of encouraging physical activity and reducing sedentary time to support adolescent mental health.
10	Effect of Physical Exercise Training on Neural Activity During Working Memory in Major Depressive Disorder, (Schwefel et al., 2025), Germany	76.41	High-intensity exercise group (HEX) and low-intensity exercise group (LEX). Both groups underwent a 12-week training program with the same frequency and duration, differing only in exercise intensity.	A 12-week high-intensity physical exercise program (HEX) can significantly reduce depressive symptoms in patients with major depressive disorder compared to the low-intensity exercise group (LEX) and the control group without exercise (waiting list). Additionally, high-intensity exercise is also associated with increased hippocampal volume, which plays an important role in mood regulation and cognitive function. These findings support the role of physical exercise as an effective additional intervention in the treatment of depression

CONCLUSION

The implementation of physical activity for depression and anxiety was recommended because it was able to reduce symptoms of depression and anxiety, as well as improve quality of life for the best golden generation 2045. This improvement was measured using several parameters: WHOQOL-Old, PSS, MET, IPAQ, ESSE, and HADS. The recommended physical activity was jogging with moderate and vigorous intensity 2 times per week or with other physical activities at least <600 METs-min/wk with 150 minutes of moderate intensity activity, or more than 75 minutes of vigorous intensity physical activity per week. There needed to be deeper studies and more databases to obtain better results. In addition, studies with a demographic approach by region based on continents and countries were needed so that they could be used as better references.

LIMITATIONS OF THE RESEARCH

This literature review had limitations because it was difficult to find journals that discussed physical exercise for depression and anxiety, quality of life improvement, and the use of antidepressants for depression and anxiety within the past five years that met the inclusion criteria. The predominance of Western countries as study locations was a limitation of this article.

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