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The effect of types of exercise on the mental health of non-athletes (comprehensive review)

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Abstract:
Background and goal:
Mental health refers to a person's emotional, psychological and social well-being. It affects how a person thinks, feels, and behaves, and helps determine how they manage stress, relate to others, and make choices.
Method:
Google Scholar, Scopus, Pub Med, Wos and MDPI databases were used to search for articles in English from 2020 to 2024. Articles were extracted using the keywords of mental illness, behavior, depressive disorder and exercise. Finally, 71 article titles were searched based on the keywords used, and after reviewing the articles based on the entry and exit criteria and removing duplicate articles, 15 high-quality articles related to the effect of various types of exercise on the mental health of inactive people were obtained.
Findings:
Exercise can improve mental health in people with or without mental disorders and reduce symptoms of major depressive disorder (MDD). Physical activity interventions can also help reduce symptoms of depression in children, adolescents, and students. In addition, aerobic exercise is beneficial for improving the mental health of the elderly and can prevent common mental disorders. Overall, exercise interventions have a beneficial effect on depressive symptoms across a wide range of ages.
Conclusion:
Exercise has positive effects on the mental and emotional health of people and can be used as an effective solution to deal with depression. On the other hand, the type and intensity of exercise may affect people's mental and emotional health.

Keywords: mental health, non-athletes, depressive disorder, exercise

Introduction

Major depressive disorder (MDD) is a prevalent and extensively studied form of depression that is marked by persistent feelings of sadness, an absence of joy, and a disinterest in activities that are typically enjoyable (anhedonia). These symptoms deviate from the individual's typical state and lead to significant distress or impairment for a period lasting at least 2 weeks (1). Depression affects a significant number of children and adolescents, with a global prevalence rate of 6.2%, making it the second most common mental disorder in this age group (2). Depression in early childhood can lead to significant challenges in social interactions, mental and physical well-being, and even suicidal tendencies (3). Experiencing depressive symptoms at a young age can significantly increase the likelihood of developing more severe mental health disorders later in life. Studies have found that as many as 67% of young individuals with depressive symptoms are at risk of developing full-syndrome depressive or anxiety disorders in adulthood. This highlights the importance of addressing and managing depressive symptoms in youth to prevent the onset of more serious mental health conditions in the future (4). The connection between mental and physical health has long been recognized, with the ancient motto "a healthy mind in a healthy body" reflecting this understanding. Numerous scientific studies have provided evidence of the reciprocal relationship between mental and physical well-being. Research has shown that mental health can impact physical performance, while physical fitness can also have a significant impact on mental performance and overall mental health. This interconnectedness highlights the importance of addressing both aspects of health in order to achieve overall well-being (5). Engaging in regular physical activity, such as

recreational and competitive sports, can have a significant impact on the mental well-being of adolescents and young adults. Research has shown that participation in sports can help reduce stress, alleviate depressive symptoms, decrease general and social anxiety, and combat feelings of loneliness. This is especially important during the critical life period of adolescence and young adulthood when individuals are navigating various challenges and facing increased levels of stress and pressure. By promoting and encouraging participation in sports, we can help prevent mental disturbances and promote a healthy and positive mindset among this age group. So, integrating sports into the lives of adolescents and young adults is crucial for their overall mental well-being (6, 7). While exercise has long been known for its physical health benefits, its impact on mental well-being has become increasingly evident in recent years. Studies have shown that regular physical activity can help reduce symptoms of anxiety and depression, boost mood, and enhance cognitive function. The relationship between exercise and mental health is multi-dimensional, involving biological, psychological, and social factors. It is essential to recognize the profound effects of exercise on mental health in order to develop effective interventions and promote overall well-being (8). Regular physical activity has been proven to have a positive impact on mental health. Research published in the Journal of Clinical Psychiatry has shown that individuals who participate in consistent exercise are less likely to suffer from symptoms of depression and anxiety. This indicates that exercise can serve as an effective and accessible form of treatment for mental health issues. Therefore, integrating regular physical activity into daily schedules can be advantageous for enhancing mental well-being (9). Therefore, it is scientifically necessary to obtain sufficient and new information in order to rehabilitate this condition by examining previous studies in the field of the impact of various sports on the mental health of individuals. Therefore, the aim of the present study was to review the effect of various sports on the mental health of non-athletes.

Materials And Methods

The present study was a review type. Google Scholar, Scopus, Pub Med, Wos and MDPI databases were used to search for articles in English from 2020 to 2024. Articles were extracted using the keywords of mental illness, behavior, depressive disorder and exercise. Inclusion and exclusion criteria for the study included factors such as the effect of exercise on mental health, availability of full-text studies, articles not older than 2020, high-quality articles, and participants who did not experience other mental or physical problems. Finally, 71 article titles were searched based on the keywords used, and after reviewing the articles based on the entry and exit criteria and removing duplicate articles, 15 high-quality articles related to the effect of various types of exercise on the mental health of inactive people were obtained. - Athletes were selected for analysis by researchers. In addition, Figure 1 shows the process of article selection for the present study.

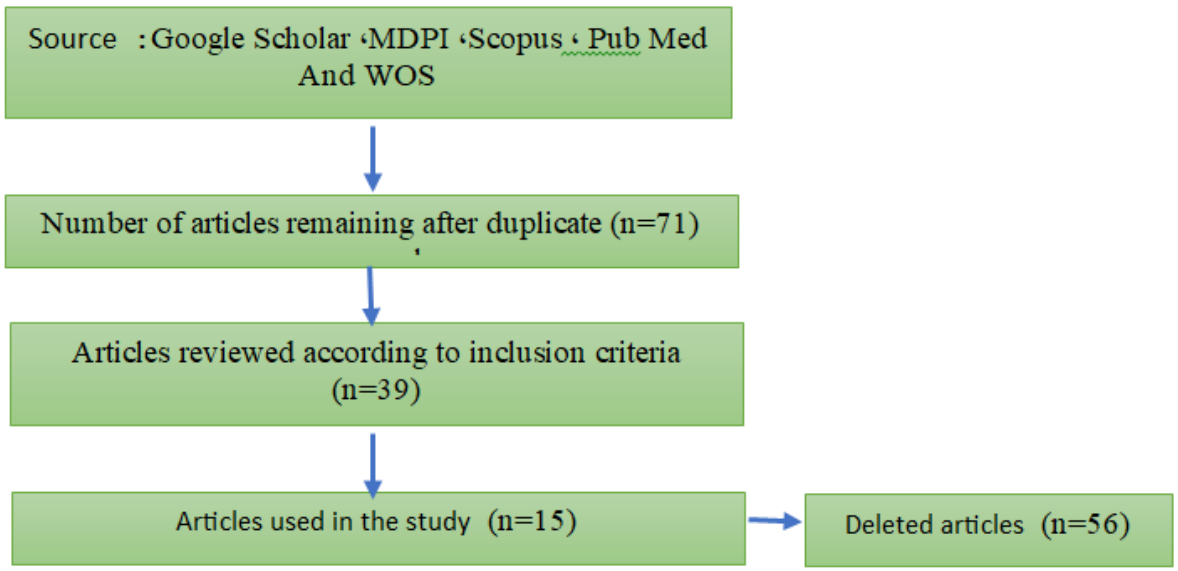

Figure 1- The process of selecting articles.

Results

After reviewing 15 articles, the results were stated as follows. (1. Engaging in physical activity before the birth and up to 6 months postpartum reduces the likelihood of experiencing depression (10). (2. The KAP toward exercise among MDD patients is poor in Shanxi (11). (3. RT was able to improve mental health outcomes in

individuals with and without mental disorders (12). (4. Exercise mitigates the symptoms of depression, even among individuals diagnosed with Major Depressive Disorder (MDD) (12). (5. A significant and substantial reduction in symptom severity was observed among a healthy sample of young adults (13). (6. Physical activity interventions can assist in reducing symptoms of depression in children and adolescents (14). (7. Physical activity can alleviate cognitive rumination, anxiety, and depression among college students (15). (8. the mental health status of college students is closely related to their own physical status and understanding of mental health knowledge (16). (9. Athlete support personnel should be trained to address physical and mental health for optimal athletic performance and well-being, regardless of competitiveness (17). (10. Balancing sports practice can be a helpful coping strategy for managing daily stress and promoting overall well-being (18). (11. The available evidence suggests that aerobic exercise is beneficial for improving the mental health of adults aged 60 years and older (19). (12. Compelling evidence shows that physical activity and exercise can prevent common mental disorders and have multiple benefits for people with a wide range of mental health issues (20). (13. Physical exercise can directly affect the level of mental health, and it can also indirectly affect the level of mental health through self-efficacy (21). (14. The evidence from this study suggests that exercise interventions have a beneficial effect on depressive symptoms in the general population across a wide age-range (24).

Table 1. Investigating the effect of types of exercise on the mental health of non-athletes

names	**year of publication and journal**	**Structure of the study**	**Type of intervention**	**Conclusion**
Karim et al. **(10)**	2024 Women's Health Issues	Data came from the Health in Pregnancy and Postpartum study (N = 205). Physical activity was measured using the SenseWear Armband at 16 weeks' or fewer and 32 weeks' gestation and categorized into 1) never meeting 2018 physical activity guidelines, 2) meeting the guidelines at one time point, or 3) meeting the guidelines at both time points. Antenatal depressive symptoms were assessed at 32 weeks' gestation, and postpartum depressive symptoms were assessed at 6 and 12 months postpartum using the Edinburgh Postnatal Depression Scale. A score of 10 or higher was defined as probable at least minor depression (hereafter, probable depression).	physical activity	Antenatal physical activity was associated with lower odds of probable depression at 6 months after childbirth. Physicians should use evidence-based strategies to encourage pregnant people, especially those who are at risk for postpartum depression, to meet physical activity guidelines.
Cheng et al. **(11)**	2024 BMC Public Health	This cross-sectional study was conducted at the First Hospital of Shanxi Medical University between April and October 2023 in patients with MDD. A self-designed questionnaire was used to evaluate the KAP (Cronbach's $\alpha = 0.787$).	exercise	The KAP toward exercise among MDD patients is poor in Shanxi. Females, people living in urban or suburban areas, with lower income, and self-reported unclear depression levels should be targeted by education interventions.

		The minimum-maximum scores were 2–23 for knowledge, 11–55 for attitude, and 7–35 for practice.		
Cunhaab et al. **(22)**	2024 Psychiatry Research	Methods All studies that were available on 28th April 2023. For the analysis of intervention effects on depressive and anxiety symptoms, standardized mean differences and standard errors were calculated. Meta-analyses using random-effects models, employing robust variance meta-regression for multilevel data structures, with adjustments for small samples.	Resistance exercises	Conclusion RT was able to improve mental health outcomes in individuals with and without mental disorders, and some RT characteristics influenced the effect of RT on mental health.
Singh et al. **(23)**	2023 British Journal of Sports Medicine	Eligibility criteria for selecting studies Systematic reviews with meta-analyses of randomised controlled trials designed to increase physical activity in an adult population and that assessed depression, anxiety or psychological distress were eligible. Study selection was undertaken in duplicate by two independent reviewers.	physical activity	Conclusion and relevance Physical activity is highly beneficial for improving symptoms of depression, anxiety and distress across a wide range of adult populations, including the general population, people with diagnosed mental health disorders and people with chronic disease. Physical activity should be a mainstay approach in the management of depression, anxiety and psychological distress.
Blumenthal et al. **(12)**	2023 Progress in cardiovascular diseases	39 trials (2326 participants) fulfilled inclusion criteria, of which 37 provided data for the meta-analyses. For the 35 trials (1356 participants) comparing exercise versus no treatment or a control intervention.	exercise	In summary, accumulated evidence from both observational studies and RCTs indicate that exercise diminishes depressive symptoms, even among individuals with MDD. These findings add to the extant literature suggesting that exercise can enhance self-esteem, increase self-confidence, and improve QoL. Thus, in addition to the cardiovascular benefits of exercise, exercise now may be considered an effective therapeutic modality for aiding in the prevention

				and treatment of depression.
O'Sullivanab et al. **(13)**	2023 Psychiatry Research	Participants in these trials were not initially recruited based on depressive symptoms. At the start of the study, they completed questionnaires measuring symptoms of generalized anxiety disorder (GAD), including the PDSQ-GAD and PSWQ, as well as other measures of GAD symptoms. They were then categorized as either meeting the criteria for GAD (PDSQ-GAD ≥6 and PSWQ ≥45) or not. The participants were then separated into parallel trials based on their GAD status and randomized to receive the same treatment program, with the groups stratified by sex and GAD status.	Resistance exercises	Eight weeks of ecologically-valid RET designed in accordance with WHO and ACSM guidelines resulted in clinically-meaningful, large-magnitude reductions in depressive symptoms among an otherwise healthy sample of young adults. Sub-analyses also revealed large antidepressant effects among participants with AMDD and AGAD. There is a potential synergistic effect among those with AGAD, such that reductions in depressive and anxiety symptoms following RET augment each other. The large-magnitude increase in strength was a beneficial side-effect of RET, and was not associated with changes in depressive symptoms.
Recchia et al. **(14)**	2023 JAMA pediatrics	FindingsThis systematic review and meta-analysis included 21 studies involving 2441 participants. Data SourcesPubMed, CINAHL, PsycINFO, EMBASE, and SPORTDiscus were searched from inception to February 2022 for relevant studies written in English, Chinese, or Italian.	physical activity	This review found that physical activity interventions can help reduce symptoms of depression in children and adolescents. The study suggests that older participants and those with a mental illness or depression diagnosis may benefit the most. Future research should focus on determining the best frequency, duration, and supervision of physical activity sessions for managing depressive symptoms.
Liu et al. **(15)**	2023 Frontiers in Psychology	A total of 1,292 Chinese college students were investigated by physical activity questionnaire, rumination scale, self-rating anxiety scale (SAS), and depression scale.	physical activity	(1) Physical activity can negatively predict the rumination, anxiety, and depression of college students, which means physical activity can reduce rumination, anxiety, and depression of college students. (2)

				Physical activity can not only directly affect the depression of college students, but also indirectly affect depression through the independent intermediary role of rumination and anxiety, and the chain mediation of rumination and anxiety.
Zhu et al. **(16)**	2022 Computational Intelligence and Neuroscience	The school has implemented various tools to assess and understand the psychological well-being of college students. One such tool is the Self-Examination and Evaluation Form of Psychological Symptoms (SCL-90), which helps to investigate psychological symptoms. Additionally, a Physical Exercise Psychology Measurement Scale with 8 subscales and 70 items is used to measure various aspects related to physical exercise psychology. Lastly, the Human Self-esteem Scale, specifically the College Students' Physical Self-esteem Scale (PSPP), is utilized to measure satisfaction and dissatisfaction with physical health within the context of Chinese traditional culture.	Physical education practice	In conclusion, the mental health status of college students is closely related to their own physical status and understanding of mental health knowledge. In order to improve the mental health of contemporary college students, it is constructive to integrate mental health education into the practice of physical education in colleges and universities.
Fossati et al. **(17)**	2021 International Journal of Environmental Research and Public Health	The topic of interest of the narrative review was the effect of sport and exercise participation on measures of mental fitness, and the effect of mental fitness on physical or sport performance metrics. Papers concerning the topic of interest were searched through the PubMed-Medline, Google Scholar, and Scopus online databases. Search queries were a combination of the following keywords: "mental fitness", "mental health", "sport",	physical exercise	Available scientific results are helpful in designing further studies to investigate the role of specific psychological aspects in athletes and their effects on sport activities, physical performance, and the risk of injury. Moreover, regarding competitive and noncompetitive athletes, awareness of these sensitive issues may increasingly form part of the training of support personnel in order to

		"exercise", "sport participation", "physical fitness".		guarantee the best physical and mental care to optimize athletic performance while protecting health.
Caponnetto et al. **(18)**	2021	From April 2021 to October 2021, reviewers A.L., C.R., D.C., F.R., J.T., K.P., L.M.T., M.A., M.C., M.C.V., N.R., S.P., S.R., and V.G. conducted comprehensive searches of databases including PubMed, Web of Science, EMBASE, PsycINFO, and CINHAL. They used search terms related to physical activity, cognitive functions, and cognitive deficits, as well as exercise addiction and the COVID-19 pandemic. In addition to electronic searches, they also hand-searched reference lists of included review articles for any additional sources.	Physical exercise	Therefore, the right balance of sports practice could thus become a real coping strategy useful for facing the problems of daily life and for reducing stress and negative emotions, but in a functional way to the psycho-physical health of the subject.
Yao et al. **(19)**	2021 Frontiers in Psychiatry	The literature for this study was identified by conducting a comprehensive search in electronic databases, including Web of Science, PubMed/Medline, and ProQuest. The search period ranged from January 2000 to December 2020. The keywords used in our searches were exercise, aerobic exercise	aerobic exercise	The available evidence suggests that aerobic exercise is beneficial for improving the mental health of adults aged 60 years and older. The intervention effect can be achieved regardless of the type of subject and the duration of the intervention. Further, the present study indicates that low-frequency, long-term and regular aerobic exercise is more effective for older adults. Therefore, we recommend that older adults to exercise at a low frequency depending on their physical condition.
Schuch et al. **(20)**	2021 Trends in psychiatry and psychotherapy.	This was a narrative review.	Physical activity	Compelling evidence shows that physical activity and exercise can prevent common mental disorders and have multiple benefits for people with a wide range of mental health issues. National and international guidelines recommend

				including physical activity as a therapeutic approach for depression and schizophrenia. However, implementation into clinical practice has been slow due to barriers associated with both patients and mental health professionals.
Zhao **(21)**	2021 Journal of Sport Psychology	The random sampling method is used to select undergraduates from colleges, wherein the study uses the physical exercise rating scale (PARS- -3), the General Self-Efficacy Scale (GSES) and the Symptom Self-Rating Scale (SCL-90) to survey 366 college students, and use descriptive statistics, t-test, analysis of variance to analyze resulting data.	Exercise	Physical exercise can directly affect the level of mental health, and it can also indirectly affect the level of mental health through self-efficacy. The correlation coefficients of physical exercise amount, body self-esteem and self-efficacy were significantly correlated at 0. 001 level. Body self-esteem and physical exercise had positive predictive effects on self-efficacy
Hu et al. **(24)**	2020 BMC public health	A systematic search was performed up to July 2018 using PubMed, Embase, PsycINFO, and Cochrane. Articles were included if a meta-analysis of randomized controlled trials was performed that examined the effect of exercise interventions on the onset of depression or depressive symptoms in the general population. Meta-analyses focusing on treatment of diagnosed depression were excluded. Two authors independently screened the articles and graded the quality of included meta-analyses using AMSTAR 2.	Sports exercises	The evidence from this study suggests that exercise interventions have a beneficial effect on depressive symptoms in the general population across a wide age-range.

Modified Downs and Black checklist for randomized and non-randomized studies.

Total	23	23	22	22	21	20	21	19	22	20	19	20	18	19	20

	et al. (10)	al. (11)	et al. (22)	al. (23)	hal et al. (12)	nab et al. (13)	et al. (14)	(15)	(16)	al. (17)	tto et al. (18)	(19)	et al. (20)	(21)	(24)
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	0	1	1	1	1	0	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	0	1	1	1	1	1	1	0	1	1	1	1	1	0
8	1	1	0	1	1	0	0	1	1	0	1	1	0	0	1
9	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1
10	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1
11	1	UTD	1	1	1	1	1	1	UTD	1	UTD	0	1	1	0
12	1	1	0	1	0	0	1	1	1	1	1	0	1	1	1
13	1	1	1	1	1	1	1	0	1	0	0	1	1	0	1
14	1	0	0	0	1	1	0	0	0	0	0	0	1	0	1
15	0	1	1	1	1	1	0	UTD	1	0	1	1	0	1	UTD
16	1	1	1	1	0	1	0	0	0	UTD	0	0	1	1	1
17	1	1	0	1	0	1	1	0	1	UTD	0	1	UTD	1	1
18	1	1	1	UTD	UTD	1	1	1	1	1	UTD	0	1	UTD	0
19	1	1	0	1	1	0	0	1	1	0	1	1	0	1	1
20	1	1	1	1	1	1	1	0	1	1	1	1	1	0	0
21	1	1	0	1	1	1	1	0	1	1	0	1	1	1	1
22	UTD	1	1	UTD	0	1	1	1	1	1	1	1	UTD	1	1
23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24	0	1	1	1	1	0	1	0	1	1	0	1	0	1	1
25	1	0	0	0	1	0	0	1	1	1	0	1	0	0	0
26	1	1	1	1	0	1	1	1	1	1	1	UTD	1	0	0
27	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1

Risk of Bias Assessment (No: score-0; Yes: score-1, UTD-Unable to determine)

Discussion

The aim of the present study was to investigate the impact of different types of exercise on the mental well-being of sedentary individuals. Consistent physical activity can greatly benefit one's mental health. It is linked to lower rates of depression and anxiety, as well as overall improvement in mood, stress management, and overall happiness. Incorporating regular exercise into your routine can have a substantial impact on your mental well-being and contribute to an overall sense of contentment and fulfillment. Harvey and his colleagues found that numerous studies have consistently shown a strong relationship between regular physical activity and better mental health. The American Journal of Preventive Medicine published a study that analyzed data from over 1.2 million individuals and discovered that those who engaged in regular exercise had a 43 percent lower risk of depression compared to their inactive counterparts. This finding aligns with the results of Harvey's current research (25). Moreover, Herring et al emphasized the beneficial impact of exercise on mental well-being, specifically noting its ability to alleviate symptoms of anxiety, stress, and other mental health issues. Furthermore, a meta-analysis published in the Journal of Psychiatric Research revealed that exercise interventions led to significant reductions in depression and anxiety symptoms, with effects comparable to those of psychotherapy and medication. This further supports the findings of the current study (26). The last important

aspect to consider when designing an exercise program is the level of intensity. It's important to remind patients that exercise doesn't have to be long or extremely intense in order to improve mood. This can be a helpful strategy for patients who are not very fit, which is often the case for those who are depressed. Moderate-intensity exercise, which is typically around 60%-80% of their maximum heart rate, is generally more enjoyable for these individuals compared to more intense activity (27). It is also worth considering that even though depression may increase the risk of not adhering to an exercise regimen, the rates of people with depression dropping out of exercise programs are similar to those of the general population. This suggests that while depression may pose a challenge to exercise compliance, it does not necessarily result in significantly higher drop-out rates (28). The exact ways in which exercise improves mental health have not been fully determined, but it is believed to be a result of a combination of biological, psychological, and social factors. Exercise has been found to release endorphins, the body's natural mood elevators, while also reducing levels of cortisol, the stress hormone. Additionally, the social aspect of exercising in a group or team can provide social support and reduce feelings of isolation, having a positive impact on mental well-being. In general, the evidence strongly suggests that regular exercise can have a beneficial effect on mental health and may be a crucial part of both treatment and prevention for depression and other mental health conditions. As more research is conducted in this area, it is likely that the specific mechanisms and benefits of exercise on mental health will become more clear.

Conclusion

The results indicated that exercise has positive effects on the mental and emotional well-being of individuals and can be used as an effective solution in dealing with depression. On the other hand, the type and intensity of exercise may affect its impact on the mental and emotional well-being of individuals, and as a result, it may have different effects on depression.

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