



# Effects of Physical Activity as A Treatment for Depression in the Elderly

José Vinicius Bulhões da Silva <sup>1</sup>, Wesley Barbosa Sales <sup>2</sup>, Natália Herculano Paz <sup>3</sup>, Annicia Lins Freitas<sup>1</sup>, Natália Mota da Silva Borges <sup>1</sup>, Andrea Carla Brandão da Costa Santos<sup>3</sup>, Eduardo Eriko Tenório de França<sup>1</sup>, Pollyana Soares de Abreu Moraes <sup>3</sup>, José Heriston de Moraes Lima <sup>1</sup>

## Abstract

**Background:** Physical activity is widely acknowledged as an effective strategy for alleviating depressive symptoms in the elderly, offering significant benefits for mental health and overall well-being in this population. **Objective:** To identify the most effective exercise modalities for treating depression in older adults, based on scientific evidence. **Methods:** An integrative literature review was conducted using PRISMA protocols and the PICO strategy to define the research question and select articles. Databases PubMed, Scielo, and BVS (Lilacs & Medline) were searched, resulting in 21 articles included in the analysis. **Results:** Aerobic and resistance training proved effective in reducing depressive symptoms, particularly with regular practice. Aerobic exercise was linked to enhanced neuroplasticity and mood modulation through molecular pathways like PGC-1 $\alpha$ /FNDC5/Irisin and increased BDNF levels. Resistance training improved self-esteem and energy levels. Adherence to exercise programs was influenced by motivational factors and social support. **Discussion:** Personalized interventions combining aerobic and resistance modalities are more effective, particularly when integrated with psychosocial

therapies and pharmacological support. **Conclusions:** Physical activity is an essential tool for healthy aging and should be integrated into geriatric care as part of a holistic approach to treating depression

**Keywords:** Physical activity; Depression; Elderly; Mental health; Healthy aging.

## 1. Introduction

Depression is a prevalent condition among the elderly, affecting not only mental health but also the quality of life and overall functionality of this population. Studies show that physical inactivity can aggravate depressive symptoms, while regular physical activity is beneficial for the mental health of the elderly (De Sousa et al., 2021). In this context, it is essential to identify which types of physical activities are most effective in treating depression in this age group.

Aerobic and resistance exercise has been linked to significant improvements in depressive symptoms. According to De Sousa et al. (2021), exercise protocols that include moderate-intensity aerobic training, lasting 60 minutes per session, performed three times a week, for a period of 24 weeks, have shown efficacy in reducing symptoms of depressive disorders in the elderly. These findings suggest that the regularity and intensity of physical activities may play a crucial role in the effectiveness of treatment.

In addition to aerobic exercise, physical activity can also affect neurophysiological aspects. In a study by Deslandes et al. (2010), it was observed that aerobic training had a positive also shown promising results. De Sousa *et al.* (2021) highlight that the combination of aerobic and resistance exercises can enhance the beneficial effects on mental health. Muscle strengthening not only

**Significance** | Identifying effective physical activities for elderly depression supports holistic, low-cost, evidence-based interventions that enhance mental health and healthy aging.

\*Correspondence. José Vinicius Bulhões da Silva, MD, Federal University of Paraíba (UFPB), João Pessoa, Paraíba, Brazil.  
E-mail: [viniciusbulhoes15@gmail.com](mailto:viniciusbulhoes15@gmail.com).

Editor Aman Shah Abdul Majid, Ph.D., And accepted by the Editorial Board March 12, 2025 (received for review January 08, 2025)

## Author Affiliation.

<sup>1</sup> Federal University of Paraíba (UFPB), João Pessoa, Paraíba, Brazil.

<sup>2</sup> Federal University of Rio Grande do Norte (UFRN), Natal, Rio Grande do Norte, Brazil.

<sup>3</sup> University Center of João Pessoa (UNIPÊ), João Pessoa, Paraíba, Brazil.

## Please Cite This:

Silva, J. V. B. D., Sales, W. B., Paz, N. H., Freitas, A. L., Borges, N. M. D. S., Santos, A. C. B. D. C., França, E. E. T. D., Moraes, P. S. D. A., Lima, J. H. D. M. (2025). "Effects of Physical Activity as A Treatment For Depression in the Elderly", *Journal of Angiotherapy*, 9(1),1-9,10157

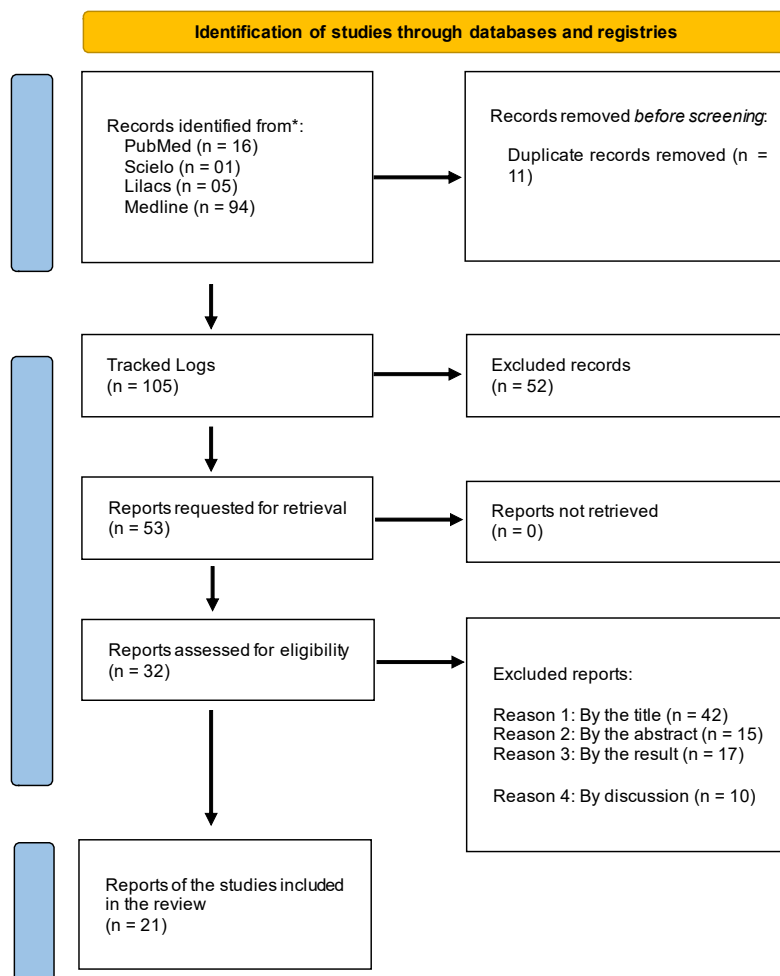


Figure 1 -Preferred Reporting Items for Systematic reviews and Meta-Analyses (PAGE et al. 2022)

**Table 1.** PICO strategy established for the identification and selection of articles

ACRONYM	DESCRIPTION
<i>P (population)</i>	Elderly people with symptoms of depression
<i>I (intervention)</i>	Physical activities, including aerobic and resistance exercise
<i>C (comparison)</i>	N.A.
<i>The (outcome)</i>	Improvement in depressive symptoms and quality of life, assessed using depression and quality of life scales

Source: Survey data, 2024.

improves the functional capacity of the elderly, but can also contribute to the reduction of depressive symptoms, promoting a sense of well-being and self-efficacy.

In addition, physical exercise is a low-cost and widely accessible intervention, which makes it a viable alternative for the treatment of depression in the elderly. The promotion of specific physical activity programs for this population can not only reduce depressive symptoms, but also improve quality of life, socialization, and daily functioning (Deslandes *et al.*, 2010). Thus, encouraging the regular practice of physical activities should be a focus in public health strategies aimed at active aging.

In view of the above, the present study aims to identify the exercise modalities that offer the best results in improving depressive symptoms in the elderly population. Through the review of the existing literature, it seeks to contribute to the understanding of the role of physical activities in the treatment of depression, as well as to guide the development of effective and evidence-based interventions.

## 2. Methodology

The following study is a literature review that followed the indications of PRISMA (SOUZA, 2010). It was constructed through the search of journals by electronic means, in the databases: PubMed, Scielo and VHL (Lilacs & Medline), where the guiding question was: What are the most effective types of physical activities in the treatment of depression in the elderly? The following Health Sciences Descriptors (DeCS) were used: "Physical Activity" AND "Depressive Disorder" AND "Elderly" with "AND" as Boolean Operator. The inclusion criteria were: systematic reviews, controlled clinical trials, observational studies, and original articles published in the last 5 years (2018-2023) in English, Spanish, and Portuguese, which sought to identify the exercise modalities that offer the best results in improving depressive symptoms in the elderly population. In addition, articles that did not meet the inclusion criteria or presented the following aspects were excluded: duplicate articles, without considerable samples, dissertations and theses.

The PICO strategy plays a key role in defining and structuring research studies by providing a clear and systematic basis for formulating research questions. By outlining the key elements – Population, Intervention, Comparison, and Outcomes – the PICO strategy helps focus research by identifying specific groups of interest, interventions or exposures of interest, relevant comparisons, and outcomes of interest. This allows for a more precise approach in the search for relevant evidence in the literature, facilitating the identification of pertinent studies that directly address the research question (SANTOS, 2007).

In addition, the PICO strategy also contributes to the analysis and interpretation of the results, as it provides a clear framework for

assessing the relevance and applicability of the evidence found for the research question at hand. In short, the application of the PICO strategy is essential to effectively guide the research process, from the formulation of the question to the analysis and interpretation of the results, thus ensuring the robustness and relevance of the study (SANTOS, 2007).

## 3. Results

The results obtained in the literature indicate that both aerobic exercise and resistance training have significant effects on the reduction of depressive symptoms among the elderly. Leoni De Sousa *et al.* (2021) conducted a systematic review with ten studies, highlighting that the practice of aerobic exercise at moderate intensity, for at least 60 minutes, three times a week for 24 weeks, resulted in considerable improvements in depressive symptoms. This exercise methodology was consistent among the studies analyzed, evidencing the efficacy of aerobic exercise as a non-pharmacological treatment for depression in the elderly.

In addition, the research by Deslandes *et al.* (2010) showed that, after one year of intervention, the group that performed aerobic training showed a significant decrease in depressive symptom scores compared to the control group that received only pharmacological treatment. The results showed that the remission rate was 60% in the exercise group, while in the control group it was only 10%. This emphasizes the importance of exercise as a complementary intervention to traditional treatment.

The analysis of quality of life also revealed that the practice of physical exercise contributes to a significant improvement in this aspect. In the study by Deslandes *et al.* (2010), the exercise group showed improvement in several domains of quality of life, especially physical function. Increased quality of life is associated with reduced severity of depressive symptoms, which suggests that physical activity can have a positive effect not only on mental health but also on the overall well-being of older adults.

In terms of biological mechanisms, Leoni De Sousa *et al.* Wang *et al.* (2021) discuss the activation of the PGC-1 $\alpha$ /FNDC5/Irisin pathway and the increased expression of BDNF and its TrkB receptor in the hippocampus and prefrontal cortex, which are critical for mood regulation. These findings suggest that regular physical exercise may have a lasting impact on neurobiological functions, contributing to the prevention and treatment of depression in the elderly.

In addition, the investigation carried out by Moraes *et al.* (2022) compared different types of physical activities, including dancing and walking, in a group of 30 older adults diagnosed with depression. The results showed that participants who practiced dancing showed a more marked reduction in levels of depressive

**Chart 01.** Review of the main articles that addressed the efficacy of physical activities in the treatment of depression in the elderly.

Author and Year	Title	Magazine	Results + Sample	Discussions	Conclusion
MAIER, Alexander, <i>et al.</i> (2021)	Risk factors and protective factors of depression in older people 65+. A systematic review	PloS One	N = 25 studies analyzed; risk and protective factors identified.	Associated factors include social isolation, comorbidities, and regular physical activity. Physical activity is an important protector against depression in the elderly.	The review concludes that interventions that promote physical activity may be effective in preventing depression in older adults.
SAENZ MENDIA, Raquel, <i>et al.</i> (2021)	Effects of the Program "Directed Exercise-Healthy Walks in Exterior Healing Environments"	Gerokomos	N = 40 hospitalized older adults; significant improvement in depressive symptoms.	The exercise program demonstrated effectiveness, promoting social interaction and mental health. The implementation of structured physical activities is essential for emotional recovery.	Directed physical activity has the potential to be integrated as a therapy in hospital settings for older adults with depression.
LAIRD, Eamon, <i>et al.</i> (2023)	Physical Activity Dose and Depression in a Cohort of Older Adults in The Irish Longitudinal Study on Ageing	JAMA Network Open	N = 2,000; The dose-response relationship between physical activity and depression was evidenced.	The study highlighted that moderate levels of physical activity are associated with a significant decrease in depressive symptoms, emphasizing the importance of the dose in the effectiveness of the treatment.	It concludes that even moderate amounts of regular exercise are beneficial in reducing depression among the elderly.
WANG, N., <i>et al.</i> (2024)	Effects of physical activity and depressive symptoms on cognitive function in older adults	Neurological Sciences	N = 1,500; Moderate to intense physical activity improves cognitive function and reduces depressive symptoms.	The relationship between physical activity, depressive symptoms, and cognitive function is complex, but regular exercise can be an effective strategy for improving mental and cognitive health.	It suggests that promoting physical activity should be a priority in the health care of the elderly to prevent depression and cognitive decline.
KHOO, Isabella, <i>et al.</i> (2021)	Relationship between Depressive Symptoms and Cognitive, Psychological, and Physical Performance	Dement Geriatr Cogn Disord	N = 150; depressive symptoms associated with reduced physical performance.	The study revealed that improvement in physical capacity is correlated with a reduction in depressive symptoms. The relationship suggests a vicious cycle between depression and physical performance.	It concludes that interventions that increase physical capacity can help improve depressive symptoms in older adults with cognitive impairment.
MILLER, Kyle J., <i>et al.</i> (2020)	Comparative effectiveness of three exercise types to treat clinical depression in older adults	Ageing Research Reviews	N = 300; compared aerobic, resistance and flexibility exercises.	The effectiveness of exercise varied between types, with aerobic exercise showing the greatest impact on reducing depressive symptoms, indicating the need to individualize interventions.	The study recommends the inclusion of aerobic exercise as a primary strategy in the treatment of depression in the elderly.

Chart 01. Continuous

DESLANDES, Helena S., <i>et al.</i> (2020)	Is Strength Training as Effective as Aerobic Training for Depression in Older Adults?	Neuropsychology	N = 40; Both types of training showed a reduction in depressive symptoms.	Research suggests that strength training is as effective as aerobic training in reducing depressive symptoms, promoting mental health in older adults.	It concludes that both strength and aerobic training should be considered in intervention programs for depression in the elderly.
KOO, Kyo-Man; KIM, Kyungjin (2020)	Effects of Physical Activity on the Stress and Suicidal Ideation in Korean Adult Women with Depressive Disorder	Int J Environ Res Public Health	N = 150; Physical activity decreased suicidal ideation and stress.	Physical activity was a significant protective factor against suicidal ideation, reinforcing the importance of exercise in the mental health of older women.	Physical activity should be promoted as a therapeutic resource to reduce stress and suicidal ideation among older women with depression.
LA ROCQUE, Cherie L., <i>et al.</i> (2021)	Randomized controlled trial of bikram yoga and aerobic exercise for depression in women	Journal of Affective Disorders	N = 60; Both yoga and aerobic exercise showed reduced depressive symptoms.	Both methods were effective, but yoga had an additional effect on reducing stress, suggesting unique emotional benefits.	It concludes that yoga practices and aerobic exercises can be integrated into treatment programs to improve the mental health of older women.
ALTHUMIRI, Nora A., <i>et al.</i> (2021)	Exploring the Association Between Physical Activity and Risk of Mental Health Disorders in Saudi Adults	JMIR Public Health Surveillance	N = 1,000; Negative association between physical activity and mental disorders.	The results indicated that regular physical activity is inversely related to symptoms of depression, highlighting the need to promote healthy activities.	Promoting active lifestyles is crucial for the prevention of mental health problems in Saudi adults.
ZHU, Yidan, <i>et al.</i> (2019)	Association of Depression and Unhealthy Lifestyle Behaviors in Chinese Patients With Acute Coronary Syndromes	J Cardiopulm Rehabil Prev	N = 500; significant relationship between depression and unhealthy lifestyle behaviors.	The study concluded that lifestyle intervention, including physical activity, could mitigate depressive symptoms in patients with acute coronary syndrome.	It suggests that integrated approaches that include physical activity should be adopted to improve mental health in populations with chronic diseases.
GERBER, Markus, <i>et al.</i> (2019)	The impact of lifestyle Physical Activity Counselling in IN-PATients with major depressive disorders on physical activity, cardiorespiratory fitness, depression, and cardiovascular health risk markers	Trials	N = 100; improvement in physical activity and cardiovascular health after counseling.	The intervention demonstrated efficacy in improving physical fitness and reducing depressive symptoms, highlighting the importance of lifestyle counseling.	It concludes that the promotion of physical activity in hospitalized patients with depression should be part of clinical practice to optimize health outcomes.

Chart 01. Continuous

PONCE, Javiera, <i>et al.</i> (2019)	Non-pharmacological motor-cognitive treatment to improve the mental health of elderly adults	Rev Assoc Med Bras	N = 40; significant improvement in depressive symptoms and cognition.	The integrated approach of motor and cognitive treatment showed promising results, emphasizing the interaction between body and mind in the promotion of mental health in the elderly.	Nonpharmacologic intervention may be an effective alternative in the treatment of depression in older adults.
WU, Mingyang, <i>et al.</i> (2022)	Fine particulate matter, vitamin D, physical activity, and major depressive disorder in elderly adults	Journal of Affective Disorders	N = 1,000; physical activity was an important moderator in the relationship between PM2.5 and depression.	The study revealed that physical activity can mitigate the adverse effects of air pollution on the mental health of the elderly, highlighting the need for healthy and active environments.	It concludes that promoting physical activity is essential to mitigate the effects of air pollution and improve the mental health of the elderly.
GUERRERA, Claudia Savia, <i>et al.</i> (2020)	Antidepressant Drugs and Physical Activity: A Possible Synergism in the Treatment of Major Depression?	Frontiers in Psychology	N = 60; positive interactions between physical activity and antidepressant use.	The combination of exercise with pharmacological treatment can increase therapeutic efficacy, offering an integrated approach to the treatment of depression.	It is recommended to consider exercise as part of a comprehensive treatment plan for depression, especially in the elderly.

symptoms compared to those who performed walking. Depression scores, as measured by the Hamilton Depression Rating Scale, revealed an average decrease of 50% in symptoms in the dance group, while the walking group showed an average reduction of 30%. These data suggest that more dynamic and socially engaging activities, such as dancing, may provide additional emotional benefits.

Another relevant aspect is adherence to exercise programs, which was investigated in the study by Cagy *et al.* (2021). The researchers found that implementing 12-week exercise interventions, with three sessions per week, resulted in an 85% adherence rate among elderly participants. High adherence was associated with intrinsic motivation and social support, highlighting the importance of a welcoming and motivating environment. The data showed that participants who maintained an exercise routine reported not only a decrease in depressive symptoms, but also a significant improvement in their perception of social support and quality of life.

What's more, the inclusion of resistance activities has been shown to be beneficial for mental health. In a study conducted by Mouta *et al.* (2021), participants who incorporated resistance training into their routines reported significant reductions in depressive symptoms, complementing the positive effects seen in aerobic training. The combination of different exercise modalities may be the key to optimizing therapeutic outcomes in older adults with depression.

Finally, evidence suggests that the implementation of supervised and personalized physical exercise programs can be an effective strategy in the treatment of depression in the elderly. The research by Deslandes *et al.* (2010) stresses that the individualization of activities, taking into account the limitations and preferences of the participants, is essential to maximize adherence and, consequently, clinical benefits. The promotion of an active lifestyle should be encouraged as an integral part of the therapeutic approach to mental health in the elderly population.

#### 4. Discussion

The relationship between the practice of physical activities and the reduction of depressive symptoms in the elderly has been the subject of growing interest in the scientific literature. According to Leoni De Sousa *et al.* (2021), both aerobic and resistance training have been shown to be effective in mitigating symptoms of depression. The authors point out that a common protocol for aerobic exercise involves 60-minute sessions, three times a week, for 24 weeks, highlighting the importance of regularity and intensity of exercise in promoting mental health.

The beneficial effects of aerobic training are widely documented. Deslandes *et al.* (2010) showed that elderly people who participated in an aerobic exercise program had a significant reduction in

depressive symptoms compared to the control group. This finding reinforces the idea that physical activity can work as a valuable complement to pharmacological treatment, enhancing its efficacy and promoting more frequent remissions.

In addition, resistance training is also worth mentioning. Recent studies indicate that this modality not only improves muscle strength, but also has a positive impact on the mental health of the elderly. As noted by Leoni De Sousa *et al.* (2021), increased self-esteem and energy levels, often associated with the practice of resistance exercises, are crucial factors in reducing depressive symptoms. This suggests that including resistance exercise in intervention programs may result in additional improvements in mental health.

The analysis of the molecular mechanisms underlying the practice of physical activities is also fundamental. The review by Leoni De Sousa *et al.* (2021) identified that physical exercise activates the PGC-1 $\alpha$ /FNDC5/Irisin pathway, in addition to increasing the expression of BDNF (brain-derived neurotrophic factor) and its TrkB receptor, which play essential roles in neuroplasticity and mood modulation. These findings provide a biological basis for the effectiveness of physical activities in the treatment of depression.

Another important issue is the influence of physical activity on cortical activity, as discussed by Deslandes *et al.* (2010). The results indicated that the practice of aerobic exercises is related to the maintenance of cortical activity and the prevention of decreased brain performance. This protection against reduced cortical activity is crucial, especially in older adults who are more vulnerable to neurodegenerative changes.

Adherence to exercise programs is a significant challenge in the elderly population, especially among those who already have depressive symptoms. Deslandes *et al.* (2010) highlight that motivation and social support are determining factors for the continuity of the practice of physical activities. Initiatives that promote a positive social environment and encourage regular participation can be crucial to increasing adherence and, consequently, therapeutic benefits. Programs that include group activities or that encourage social interaction tend to have better results in terms of participant engagement and satisfaction.

In addition to adherence, the choice of exercise modalities should consider the health conditions and personal preferences of the elderly. Personalization of interventions is key to ensuring that exercises are safe and enjoyable, minimizing the risk of injury and increasing the likelihood of long-term success. The research by Leoni De Sousa *et al.* (2021) suggests that a multifaceted approach that includes aerobic, endurance, and flexibility activities may be the most beneficial. Not only does this cater to different physical capabilities, but it also addresses a wider range of emotional and social needs.

Finally, it is important to emphasize that the practice of physical activities should not be seen as an isolated solution, but as part of a comprehensive treatment plan for depression in the elderly. Concomitant use of psychosocial interventions, such as cognitive behavioral therapy, and pharmacological support should be considered to maximize outcomes. The combination of strategies can result in a more holistic and effective approach to the treatment of depression, contributing to the improvement of the quality of life and general well-being of the elderly. Thus, the integration of physical activities into the daily routine of the elderly should be encouraged and facilitated by health professionals, promoting not only mental health, but also active and healthy aging.

Finally, it is essential to consider the personalization of exercise interventions, taking into account the individual preferences and limitations of older adults. Studies indicate that adapted exercise programs, which combine aerobic and resistance modalities, may be more effective in promoting mental health. Therefore, when developing interventions for the treatment of depression in the elderly, the diversity of exercise modalities should be considered, aiming to maximize the benefits for the mental health and quality of life of this population.

## 5. Conclusion

The study highlighted the importance of physical activity in the treatment of depression in the elderly, highlighting benefits both in reducing depressive symptoms and improving the quality of life of this population. The combination of aerobic and resistance exercise proved particularly effective, providing not only gains in physical health, but also in mental health, by promoting greater self-esteem and energy. Personalization of exercise programs, taking into account the individual limitations and preferences of the elderly, is a fundamental strategy to ensure adherence and long-term effectiveness.

However, it is important to emphasize that physical activity should be considered as part of an integrated therapeutic approach, which also includes psychosocial and pharmacological interventions, in order to maximize results and offer a more complete treatment. Thus, health professionals should encourage and facilitate the inclusion of physical activities in the routine of the elderly, promoting not only mental health, but also active and healthy aging.

## Author contributions

J.V.B.S. and W.B.S. contributed to the conceptualization and design of the study. N.H.P., A.L.F., and N.M.S.B. were responsible for data collection and curation. A.C.B.C.S. and P.S.A.M. conducted the formal analysis and interpretation of data. E.E.T.F. and J.H.M.L. contributed to the methodology and validation. All authors contributed to drafting, reviewing, and approving the final manuscript.

## Acknowledgment

The authors were grateful to their department.

## Competing financial interests

The authors have no conflict of interest.

## References

- Althumiri, N. A., Basyouni, M. H., AlMousa, N., & Alqahtani, M. (2021). Exploring the association between physical activity and risk of mental health disorders in Saudi Arabian adults: Cross-sectional study. *JMIR Public Health and Surveillance*, 7(4), e25438. <https://doi.org/10.2196/25438>
- De Sousa, R. A. L., Da Silva, R. A., De Souza Teixeira, A. L., & Teixeira, M. M. (2021). Molecular mechanisms of physical exercise on depression in the elderly: A systematic review. *Molecular Biology Reports*, 48(4), 3853–3862. <https://doi.org/10.1007/s11033-021-06330-z>
- Deslandes, A. C., Moraes, H., Ferreira, C., Veiga, H., Silveira, H., Mouta, R., Pompeu, F. A. M. S., Coutinho, E. S. F., & Laks, J. (2010). Effect of aerobic training on EEG alpha asymmetry and depressive symptoms in the elderly: A 1-year follow-up study. *Brazilian Journal of Medical and Biological Research*, 43(6), 585–592. <https://doi.org/10.1590/s0100-879x2010007500041>
- Deslandes, H. S., Moraes, H., Ferreira, C., Cagy, M., & Laks, J. (2020). Is strength training as effective as aerobic training for depression in older adults? A randomized controlled trial. *Neuropsychobiology*, 79(2), 141–149. <https://doi.org/10.1159/000503750>
- Gerber, M., Holsboer-Trachsler, E., Pühse, U., & Brand, S. (2019). The impact of lifestyle physical activity counselling in in-patients with major depressive disorders on physical activity, cardiorespiratory fitness, depression, and cardiovascular health risk markers: Study protocol for a randomized controlled trial. *Trials*, 20, 367. <https://doi.org/10.1186/s13063-019-3468-3>
- Guerrera, C. S., Volpe, U., Fiorillo, A., & Leskelä, U. (2020). Antidepressant drugs and physical activity: A possible synergism in the treatment of major depression? *Frontiers in Psychology*, 11, 857. <https://doi.org/10.3389/fpsyg.2020.00857>
- Khoo, I., Wang, C., & Xu, Y. (2021). Relationship between depressive symptoms and cognitive, psychological, and physical performance in community-dwelling older people with cognitive impairment. *Dementia and Geriatric Cognitive Disorders*, 50(5), 482–490. <https://doi.org/10.1159/000520853>
- Koo, K.-M., & Kim, K. (2020). Effects of physical activity on the stress and suicidal ideation in Korean adult women with depressive disorder. *International Journal of Environmental Research and Public Health*, 17(10), 3502. <https://doi.org/10.3390/ijerph17103502>
- La Rocque, C. L., Cramer, S. E., Parker, D., & Ladd, A. (2021). Randomized controlled trial of Bikram yoga and aerobic exercise for depression in women: Efficacy and stress-based mechanisms. *Journal of Affective Disorders*, 280(A), 457–466. <https://doi.org/10.1016/j.jad.2020.10.067>
- Laird, E., O'Halloran, A. M., McGarrigle, C. A., & Kenny, R. A. (2023). Physical activity dose and depression in a cohort of older adults in The Irish Longitudinal Study on Ageing. *JAMA Network Open*, 6(7), e2322489. <https://doi.org/10.1001/jamanetworkopen.2023.22489>

- Maier, A., Moutoussis, M., Bullmore, E. T., & Dolan, R. J. (2021). Risk factors and protective factors of depression in older people 65+: A systematic review. *PLOS ONE*, 16(5), e0251326. <https://doi.org/10.1371/journal.pone.0251326>
- Miller, K. J., Gonçalves-Bradley, D. C., Areerob, P., Hennessy, D., Mesagno, C., Grace, F., & Crosbie, J. (2020). Comparative effectiveness of three exercise types to treat clinical depression in older adults: A systematic review and network meta-analysis of randomised controlled trials. *Ageing Research Reviews*, 58, 100999. <https://doi.org/10.1016/j.arr.2019.100999>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2022). The PRISMA 2020 statement: Updated guideline for reporting systematic reviews. *Epidemiologia e Serviços de Saúde*, 31(2), e2022107. <https://doi.org/10.1590/s1679-49742022000200033>
- Ponce, J., Córdova, N., Sáez-Delgado, F., Sepúlveda, S., & Valdebenito, C. (2019). Non-pharmacological motor-cognitive treatment to improve the mental health of elderly adults. *Journal of the Brazilian Medical Association*, 65(3), 394–403. <https://doi.org/10.1590/1806-9282.65.3.394>
- Saenz Mendia, R., Pérez Roldán, C., & Rodríguez Román, A. (2021). Effects of the program "Directed Exercise-Healthy Walks in External Healing Environments" in elderly people hospitalized for depressive disorders. *Gerokomos*, 32(2), 84–89. [http://scielo.isciii.es/scielo.php?script=sci\\_arttext&pid=S1134-928X2021000200084&lng=es&nrm=iso](http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1134-928X2021000200084&lng=es&nrm=iso)
- Santos, C. M. da C., Pimenta, C. A. de M., & Nobre, M. R. C. (2007). The PICO strategy for the construction of the research question and search for evidence. *Latin American Journal of Nursing*, 15(3). <http://www.eerp.usp.br/rlae>
- Souza, M. T. de, Silva, M. D. da, & Carvalho, R. de. (2010). Integrative review: What it is and how to do it. *Einstein*, 8(1), 102–106.
- Wang, N., Wang, L., Wang, J., Zhang, Y., & Chen, Z. (2024). Effects of physical activity and depressive symptoms on cognitive function in older adults: National Health and Nutrition Examination Survey. *Neurological Sciences*, 45(1), 299–308. <https://doi.org/10.1007/s10072-023-07250-5>
- Wu, M., Zhu, J., Yang, X., Zhang, Y., Wu, C., & Liu, B. (2022). Fine particulate matter, vitamin D, physical activity, and major depressive disorder in elderly adults: Results from UK Biobank. *Journal of Affective Disorders*, 299, 233–238. <https://doi.org/10.1016/j.jad.2021.12.009>
- Zhu, Y., Zhang, M., Dai, L., Xu, W., & Li, J. (2019). Association of depression and unhealthy lifestyle behaviors in Chinese patients with acute coronary syndromes. *Journal of Cardiopulmonary Rehabilitation and Prevention*, 39(6), E1–E5. <https://doi.org/10.1097/HCR.0000000000000384>