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Abstract: Seasonal affective disorder (SAD) or seasonal depression is a mental disorder that occurs mainly in the winter months with symptoms that differ from the well-known depression. Several forms of treatment have been explored, with exercise being promising. Objectives: The purpose of this study is to review all available studies related to exercise and physical activity in SAD, both therapeutically and on a more general clinical and research level. Material and Methods: The literature search was conducted in Pubmed, Scopus, APA Psychinfo and SPORTDiscus databases. The following keywords were used: seasonal depression, seasonal affective disorder, exercise, therapeutic exercise, physiotherapy, physical therapy and physical activity. The final studies were selected using specific inclusion and exclusion criteria. Results: Of the 169 studies initially identified, the researchers concluded on 3 studies. The symptoms of SAD can be reduced with a personalized program that includes aerobic exercise, combining perhaps the appropriate time of day, but also the presence or absence of natural or artificial light. Also, it has not been proven whether or not exercise is a predictor of SAD. Conclusion: Aerobic exercise is possibly the key for the reduction and elimination of symptoms of SAD in the winter months. However, further study in this field seems extremely necessary to find safe and reliable forms of exercise that improve the symptoms of these patients.

Summary Box

This study provides a comprehensive perspective on the treatment of SAD through exercise and beyond, informing both its benefits and its possible combined intervention. The significance of the study highlights exercise as a very important treatment modality as it can be performed without equipment and is not cost prohibitive. Also, the study having provided several years of data is considered informative for physiotherapists, both in terms of early understanding of symptoms and in the treatment options available to them.

Keywords: seasonal depression, winter depression, SAD, aerobic exercise, physiotherapy

Introduction

Depression is a mental disorder in which we observe symptoms such as loss of interest, loss of pleasure and low levels of good mood in daily activities for long periods of time.^{1,2} Depression occurs more often in adult European women and affects daily life, as well as personal relationships with family, friends, work and school.² Depression can be expressed by various physical symptoms, most notably feelings of tiredness or low energy, reduced appetite and weight loss, difficulty in sleeping, feelings of excessive guilt and poor concentration.¹ According to the World Health Organization, there are many different types of depressive disorders, one of which is seasonal affective disorder (SAD) or seasonal depression.²

The underlying meaning of depression and SAD may look the same but they differ in both symptoms and time of onset.³⁻⁵ According to the International Classification of Diseases - 11, SAD is defined as the presentation of symptoms and course of mood episodes in mood disorders with a seasonal pattern.⁶ It is necessary to mention that the term SAD should not be confused with the term winter blues, since the second condition does not require a medical diagnosis and refers mainly to a temporary form of sadness, where the person may feel depressed because of the shorter and darker days or the inability to go out because of the ice and cold, but their physical and mental health remains unaffected. Risk factors that can precipitate the onset of SAD are heredity, female gender, geographical distribution mainly in northern countries where there is not enough sunlight or the day lasts much less than the night and finally, the age at which it occurs, which is mainly between 18 and 30 years old.⁷

More specifically, SAD usually occurs in the autumn and winter months, particularly in January and February when we observe that there is less sunlight due to weather conditions.⁵ In contrast, symptoms of SAD decrease in spring and summer.⁷ Patients suffering from depression may experience seasonal worsening of their symptoms but this differs from patients suffering from SAD.⁴ More specifically, the symptoms of SAD are irritability, increased fatigue, drowsiness, increased appetite levels, decreased social interest and changes in eating habits. Patients want to consume more carbohydrates and as a result their body weight increases without being able to control it.^{3,4} About 20% of people suffering from SAD are diagnosed with type 1 and type 2 bipolar disorder.⁵

SAD is essentially an emotional interaction in which social, psychological and biological factors are involved, which have an overwhelming influence on the emotions and actions of individuals and this results in self-destructive effects. For this reason, prevention and treatment programs should be created to deal with it

properly. Several studies suggest that physical inactivity may be the reason for the onset of SAD, as well as less exposure to sunlight.⁸ It has been reported that physical exercise, and aerobic exercise in particular, reduces by 50% the symptoms of SAD, with patients being more productive and cheerful.^{9,10}

Furthermore, another form of treatment suggested for these patients is light therapy, which means continuous exposure to sunlight and/or artificial light of a specific intensity.¹¹ People with SAD after the end of treatment have positive emotions such as self-control, self-confidence and self-esteem, emotions that are absent in these patients during the onset.^{11,12} The above forms of treatment are not expensive and anyone can access them at any time of the day. Additional forms of treatment, mentioned by the World Health Organization, include medication, which may be costly but accelerates the reduction of symptoms and makes patients feel better in combination with exercise.^{2,5}

Thus, the purpose of this brief review is to examine all available studies related to exercise and physical activity in SAD, both therapeutically and on a more general clinical and research level.

Material and methods

To conduct this review, specific databases were searched with strictly selected keywords and with specific inclusion and exclusion criteria. In addition, authors declare that this study has not been registered in any international online protocol database.

The literature search was performed in Pubmed, Scopus, APA Psychinfo and SPORTDiscus databases on December 4, 2023. The following keywords were used: "seasonal depression", "seasonal affective disorder", "exercise", "therapeutic exercise", "physiotherapy", "physical therapy" and "physical activity". No time restriction was used when displaying the initial records in any of the aforementioned databases and the search strategy was captured as follows: (((("seasonal depression") OR ("seasonal affective disorder") AND (((((exercise) OR ("therapeutic exercise")) OR (physiotherapy)) OR ("physical therapy")) OR ("physical activity")))).

The inclusion criteria were studies: a) in English, b) with a sample of participants over 18 years of age, c) with a sample diagnosed with SAD using a valid and reliable measurement tool or based on a psychiatric diagnosis and d) where at least one intervention group was exclusively related to exercise or therapeutic exercise or physical activity or physiotherapy or generally as a study was related to the extraction of robust scientific results on the subject. In contrast, the exclusion criteria were for studies: a) where the sample was

healthy participants and b) where the group intervention was combined with another form of treatment (e.g. light therapy).

The eligibility of the studies was assessed separately by 2 reviewers, as well as the titles, abstracts and, finally, the full text of the studies. The same reviewers also separately performed data extraction from the finally selected studies.

Results

A search of the 4 databases resulted in 169 initial records. After removing duplicate studies, 118 articles remained and after removing 96 studies due to title, 22 remained to read the abstracts. After reading the abstracts, 10 studies were removed and 12 remained. After reviewing the full text based on inclusion and exclusion criteria, 9 studies were removed. Thus, a total of 3 studies are included in this review. The selection process of the studies is also shown graphically in Figure 1.

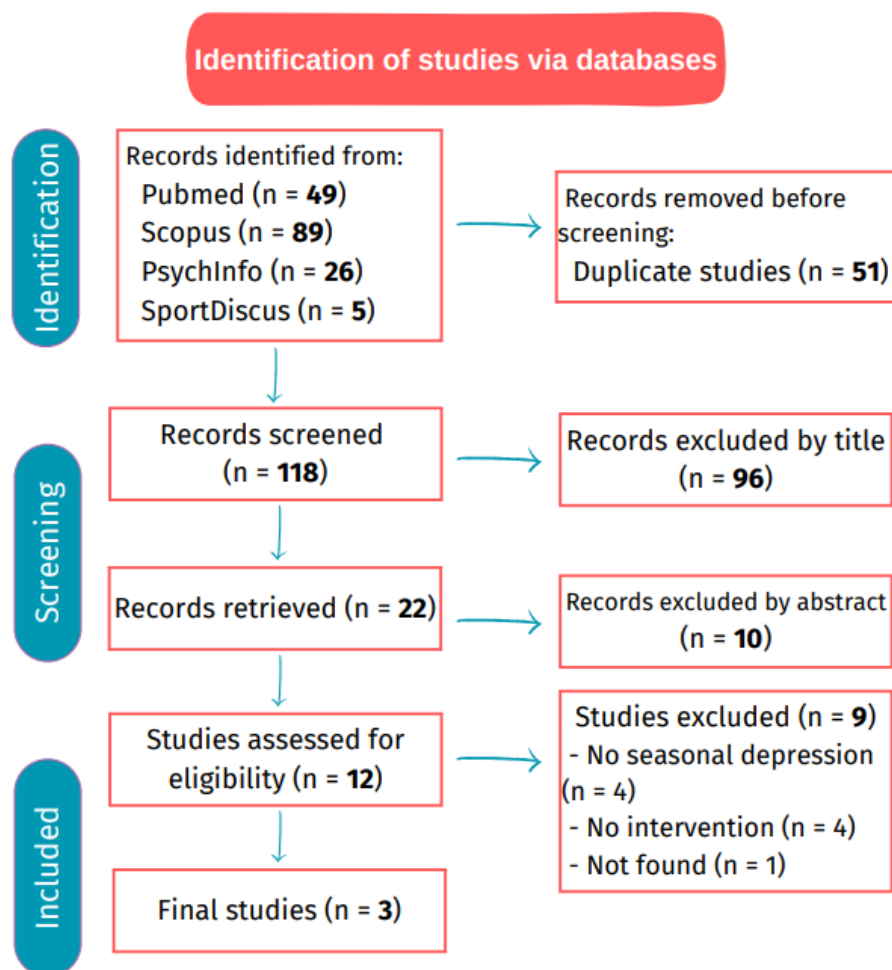


Figure 1. Graphical representation of the selection process of the final studies in the review.

Of the 3 included studies, 2 are clinical trials conducted in Russia and 1 is a survey that took place in the United States of America. All studies were conducted during at least one winter month and used individualized aerobic exercise, but also interventions with a more general concept of physical exercise and activity. The duration of the interventions was mainly one week and the assessment tools used for depressive symptoms were the Hamilton Depression Rating Scale in 2 studies and the Seasonal Pattern Assessment Questionnaire in 1 study.

Further details of each of the studies are shown in Table 1. The data reported in the table are only for intervention groups that were rigorously screened and diagnosed with SAD and are always exercise-related. Any groups other than the control groups that were screened for comparison of outcomes and outside the scope of this review were not considered by the researchers.

Regarding the effectiveness of the study interventions, Pinchasov et al., 2000 conclude that an individualized aerobic exercise program significantly reduces the symptoms of SAD (initial mean HDRS score: 17.4, final mean HDRS score: 5.7) by increasing oxygen consumption in the body, but with no statistical difference with the non-SAD group. This study is the only one we have so far showing the verified effectiveness of exercise in SAD with statistically significant results. Also, the study by Putilov et al., 2005 informs us that aerobic exercise in the midday hours is highly effective (initial mean HDRS score: 17.3, final mean HDRS score: 5.7), but concluded that it is no more favorable than exercise in the morning hours and that the treatment time may not substantially affect patients' chronobiology. This study also showed positive results regarding combined exercise and bright light therapy.

Finally, Drew et al, 2021, conducted a study in which participants were assessed with SPAQ, a self-reported scale about seasonal variations, which assessed sleep length, engagement in social activities, mood (overall feeling of well-being), weight, appetite, and energy level. Regarding their physical activity level, participants had to rate their general level of physical activity for a typical week, how often they visit their workout facility, and how social they are and feel there. The conclusion report that physical activity level is not a predictor of SAD, however it is worth noting that no conclusions have been drawn specifically for the group found diagnosed with SAD.

Study	Design	Region / Country	Intervention group	Assessment	Method	Results
Pinchasov et al., 2000 ¹³	CT	Novosibirsk, Russia	Physical exercise therapy-SAD group (n = 9) [only ♀, approximate MA = 34.8]	HDRS At baseline and 1 week after the intervention.	1-week training on stationary bicycle [12:00 – 13:00 h]. 1-hour daily of two 27-min pedaling sessions with 5 min rest. (every session: 5 min warm-up, 12 min of basic pedaling with at least a 10-min period of an exercise intensity at approximately 75% of a subject's maximal level)	Reduction of depressive symptoms (p = 0.000), but with no statistical significant differences compared with non-SAD group.
Putilov et al., 2005 ⁸	CT	Novosibirsk, Russia	Physical exercise group with SAD (n = 9 ♀)	HDRS At baseline and 1 week after the intervention.	1-week physical exercise on stationary bicycle [13:00 – 14:00].	Midday physical exercise was an effective treatment for SAD (p = 0.000).
Drew et al., 2021 ¹⁴	Survey	Fairbanks, Alaska, USA	Winter-pattern SAD group (n = 17) [♀ > ♂, the highest percentage - moderately physical active]	SPAQ, Survey questions about physical activity level.	Survey questions focused on participants' experiences at the gym (physical activity level in a "typical week" (work and leisure), frequency, gym sociality).	Physical activity level did not significantly associated with the occurrence or not of SAD.

Table 1. Sample, assessment, intervention and outcome characteristics of the studies. (CT = Clinical Trial, n = sample number, MA = Mean Age, SAD = Seasonal Affective Disorder, HDRS = Hamilton Depression Rating Scale, USA = United States of America, SPAQ = Seasonal Pattern Assessment Questionnaire).

Discussion

The objective of this brief review was to collect all available data on the effectiveness, and the association, of exercise interventions on symptoms of SAD. The results showed that a cyclometer-based aerobic exercise program significantly improves SAD. It was also found that an individual's level of physical activity is probably not a factor in the development of SAD.

Only one other review has been conducted over the years on the effects of exercise on SAD, although this one accepted studies from conference proceedings with healthy participants, reporting that there were barriers to drawing conclusions about physical activity and SAD.¹⁵ The present review is certainly more up-to-date and more rigorous in its study inclusion criteria.

Similar studies investigating the effectiveness of aerobic exercise have been conducted in Finland. First of all, the study by Patronen et al., 1998, investigated an exercise program both in combination with bright light therapy and in normal light. The physical fitness program followed by the participants involved vigorous aerobic exercise using special equipment for systematic training of the main muscle groups for 1 hour, 2-3 times a week for 8 weeks. The study concluded that supervised physical activity combined with exposure to bright light appears to be an effective intervention for improving mood and some aspects of health-related quality of life in winter. In addition, Leppämäki et al., 2002 and Leppämäki et al., 2004, followed the exact same program as the previous study but this time followed a randomized sample with the results again reporting that aerobic exercise combined with exposure to bright light works positively on SAD. At this point it is very important to mention that in all of the above studies, compared to those included in this review, it seems to be concluded that aerobic exercise definitely works, but the sample in these studies is a healthy population or depressed patients without a diagnosed SAD. So, the above results are good to consider for future research and possible treatment in these patients, but with great consideration.^{8,9,11-13}

Moreover, people with SAD experience a decrease in both the frequency of physical activity and the pleasure they get from it during the winter months and secondly report that activity patterns may have an impact on behavioral activation treatments for depression.¹⁶ In addition, it has been found that those who perform high-intensity physical activity have a lower rate of seasonal sensitivity (due to changes in the duration of natural light) and those with high seasonal sensitivity have lower psychological well-being.¹⁰

The clinical importance of the results of this review lies in the fact that there is now scientific information available for interested clinical and academic health professionals - and especially for physiotherapists - which has been retrieved under strict criteria, in order to provide a more definitive conclusion on the topic as far as possible. More specifically, it is worth observing that in two of the three included studies, a 1-week exercise program led to remarkable results in terms of SAD symptoms, which can perhaps be explained by the short "seasonal" duration of the condition, and therefore its more immediate treatment compared to other mental disorders.

The present study certainly has some limitations, the primary one being the very small number of both studies and sample. Also, through the finally selected studies the long-term effects of each intervention were not known. Finally, even the quality of the studies can be considered questionable. For all the above reasons, we suggest that future studies on this topic should be carried out with randomization of the sample, with a properly and rigorously structured clinical intervention, with a larger sample, extracting long-term results, always focusing on the patient and improving the quality of life. Also, a very good consideration for future research is how green exercise, which by definition may include aerobic exercise combined with exposure to sunlight in nature, may affect the symptoms of SAD.

In combination with the high level of evidence for exercise, and especially for individualized aerobic exercise, in depression in general, it is safe to conclude that this type of exercise can really help patients with SAD. It should not be forgotten that our bodies are made for moving and the effects of physical inactivity bring about negative changes in people, and therefore in their psychology and mental health. So patients will be able to control every symptom that occurs during the winter months with the ultimate focus of being more productive and in a better mood during the day.

Equity, Diversity, and Inclusion Statement

The authors declare responsibly that they have respected the principles of equity, diversity and inclusion in their study.

Conflict of interests

The authors declare that there is not conflict of interests.

References

1. Kyriakatis GM, Besios T, Lykou PM. The effect of therapeutic exercise on depressive symptoms in people with multiple sclerosis - A systematic review. *Mult Scler Relat Disord*. 2022 Dec; 68:104407. doi: 10.1016/j.msard.2022.104407.
2. World Health Organization. Depressive disorder (depression). [Online]. Available at the following link: <https://www.who.int/news-room/fact-sheets/detail/depression> [accessed: 17 December 2023]
3. Roecklein KA, Rohan KJ. Seasonal affective disorder: an overview and update. *Psychiatry (Edgmont)*. 2005 Jan;2(1):20-6.
4. Howland RH. An overview of seasonal affective disorder and its treatment options. *Phys Sportsmed*. 2009 Dec;37(4):104-15. doi: 10.3810/psm.2009.12.1748.
5. American Psychiatric Association. Seasonal Affective Disorder (SAD). [Online], Available at following link: <https://www.psychiatry.org/patients-families/seasonal-affective-disorder> [accessed: 17 December 2023].
6. International Classification of Diseases – 11. Seasonal pattern of mood episode onset. [Online], Available at following link: <https://icd.who.int/browse11/1-m/en#/http%3a%2f%2fid.who.int%2f11m%2f03%2f680%2f001> [accessed: 06 January 2024].
7. Galima SV, Vogel SR, Kowalski AW. Seasonal Affective Disorder: Common Questions and Answers. *Am Fam Physician*. 2020 Dec 1;102(11):668-672.
8. Putilov AA, Danilenko KV. Antidepressant effects of light therapy and “natural” treatments for winter depression. *Biological Rhythm Research*. 2005;36 (5), 423-437. doi: 10.1080/09291010500218506
9. Leppämäki S, Haukka J, Lönnqvist J, Partonen T. Drop-out and mood improvement: a randomised controlled trial with light exposure and physical exercise. *BMC Psychiatry*. 2004; 4:22. <https://doi.org/10.1186/1471-244X-4-22>
10. Alvarado C, Castillo-Aguilar M, Villegas V, Estrada Goic C, Harris K, Barria P, Moraes MM, Mendes TT, Arantes RME, Valdés-Badilla P, Núñez-Espinosa C. Physical Activity, Seasonal Sensitivity and Psychological Well-Being of People of Different Age Groups Living in Extreme Environments. *Int J Environ Res Public Health*. 2023 Jan 17;20(3):1719. doi: 10.3390/ijerph20031719.
11. Leppämäki S, Partonen T, Lönnqvist J. Bright-light exposure combined with physical exercise elevates mood. *J Affect Disord*. 2002 Nov;72(2):139-44. doi: 10.1016/S0165-0327(01)00417-7.
12. Partonen T, Leppämäki S, Hurme J, Lönnqvist J. Randomized trial of physical exercise alone or combined with bright light on mood and health-related quality of life. *Psychol Med*. 1998 Nov;28(6):1359-64. doi: 10.1017/S0033291798007491.
13. Pinchasov BB, Shurgaja AM, Grischin OV, Putilov AA. Mood and energy regulation in seasonal and non-seasonal depression before and after midday treatment with physical exercise or bright light. *Psychiatry Res*. 2000 Apr 24;94(1):29-42. doi: 10.1016/S0165-1781(00)00138-4.
14. Drew EM, Hanson BL, Huo K. Seasonal affective disorder and engagement in physical activities among adults in Alaska. *Int J Circumpolar Health*. 2021 Dec;80(1):1906058. doi: 10.1080/22423982.2021.1906058.
15. Peiser B. Seasonal affective disorder and exercise treatment: a review, *Biological Rhythm Research*, 2009;40:1, 85-97, doi: 10.1080/09291010802067171
16. Sigmon ST, Schartel JG, Boulard, NE, & Thorpe GL. Activity Level, Activity Enjoyment, and Weather as Mediators of Physical Health Risks in Seasonal and Nonseasonal Depression. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*. 2010; 28(1), 42–56. doi:10.1007/s10942-010-0106-0