



Review Article

The Effectiveness of Physical Exercise in Preventing Postpartum Depression: A Systematic Review of Randomized Controlled Trials (2019–2024)

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ABSTRACT

Article history:

Received 2 July 2025

Accepted 21 October 2025

Available online 1 December 2025

DOI: 10.47723/83113j30

Keywords: Postpartum Depression;
Exercise; Maternal; Physical Activity



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Background: Postpartum Depression (PPD) affects 13-19% of moms following childbirth. Globally, around 350,000 maternal deaths occurred in 2022, with depression accounting for 22% of all postpartum deaths. Exercise is increasingly being examined as a preventive intervention. Objective: To determine the effectiveness of exercise, specifically its type, intensity, and duration in reducing postpartum depression.

Subjects and Methods: A systematic review was conducted in accordance with the PRISMA standards. Searches for (postpartum AND exercise) or (physical activity AND lessened postpartum depression) yielded 11 suitable studies. Data were retrieved on activity features and PPD outcomes, which were predominantly evaluated using the Edinburgh Postnatal Depression Scale (EPDS).

Results: Aerobic exercise was the most constant and successful intervention. Women who engaged in moderate-intensity aerobic exercise (30-45 minutes, 3-5 times per week) had significantly lower depression symptoms than controls (standardized mean difference [SMD] = -0.42; 95% CI: -0.65 to -0.19; $p < 0.001$). Exercise interventions were also linked to a 32% lower chance of having PPD (risk ratio [RR] = 0.68; 95% CI: 0.52 to 0.85). Subgroup analyses suggested greater benefits when exercise was initiated during pregnancy and continued postpartum.

Conclusions: Structured physical exercise can be considered a safe, low-cost adjunct to prevent the occurrence of Postpartum Depression in mother psychological well-being through enhanced endorphin release and body image perception. Integration of exercise into maternal health programs may substantially reduce the burden of postpartum depression.

Introduction

The psychological condition of a mother after giving birth is one of the crucial factors in assessing the mother's health status. A mother with psychological disorders will be dangerous for both the baby and herself, such as reduced breast milk production for the baby, a lack of desire to touch her baby, and even feelings of wanting to end her life¹. Hormonal, anatomical, biological, and physiological changes in the

mother's body that occur from pregnancy to childbirth will affect the mother's psychological condition after giving birth if not properly addressed². Social support, particularly from partners and close family, has been identified as a protective factor during this vulnerable period³.

PPD is a serious psychological condition because it is associated with health problems for both the mother and the baby. Women with a history of depression before pregnancy or at least having symptoms

of postpartum depression are at high risk of experiencing PPD in this pregnancy. Globally, it is estimated that 19–25% of women experience PPD⁴. Around 350,000 maternal deaths in 2022, with 22% of these deaths occurring during the postpartum period, one of the main causes being depression⁵. From the numerous cases and consequences of the PPD phenomenon, many still do not understand that these incidents can be prevented.

According to a study, antidepressant medication can treat PPD, but prevention is certainly better than treatment. One highly impactful alternative in preventing PPD is engaging in regular exercise from the time of pregnancy. Exercise has been proven to be more effective in increasing endogenous endorphins and opioids, which help improve the psychological well-being of mothers⁶. However, in previous studies, there were several types of exercise that were proven to have little or even no impact on the improvement of maternal well-being when viewed from the duration, intensity, and type of exercise⁷. Although evidence suggests that exercise may prevent PPD, the optimal exercise regimen including its duration, intensity, and type remains unclear. Addressing this gap, this systematic review analyzes available evidence to identify the most effective exercise approaches for preventing postpartum depression.

Subjects and Methods

Search Strategy and Procedure

This type of systematic review research uses searches from journal databases such as MEDLINE-PubMed, Web of Science, Scopus and Science Direct. We use the PRISMA checklist as a guideline to ensure all steps are carried out correctly⁸. This was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. A comprehensive literature search was performed in four electronic databases: MEDLINE (PubMed), Web of Science, Scopus, and Science Direct. The search covered publications from January 2019 to December 2024. The PICO framework guided the search Population(P): Postpartum; Intervention(I): Exercise; Comparator(C): physical activity; Outcome(O): Decrease Postpartum Depression. There are 11 articles obtained and analyzed; data extraction was performed on the selected articles to review the text as a whole using the flow PRISMA).

Eligibility Criteria

This systematic review aims to analyze the most effective sports in reducing PPD based on the intensity and duration of the exercise. Therefore, we identified the inclusion criteria that must be met with research design: Randomized Controlled Trial, Clinical Trial. The exclusion criteria in this review were studies without clear intervention protocols or outcome measures; non-peer-reviewed sources (conference abstracts, opinion papers). To maximize comprehensiveness, we preference was given to more recent research during synthesis. National journals not indexed in international databases were excluded to ensure methodological consistency, peer-review standards, and broader generalizability of findings. This review was exempt from ethical approval, as it analyzed previously published studies, all of which reported having obtained ethical clearance.

Selection Process

Four Author (D.R.S.P, L.P, S.N.S) reviewed the whole article (96 article) begin with screening titles and summaries of the articles found in the database search according to the keywords and classify them into articles that meet the inclusion criteria and those that do not. The third Author (S.N.S) helps mediate if there are differences of opinion between the three reviewers. Potentially selected articles were read in their entirety, and 11 articles relevant to the aims of this review were approved by all authors.

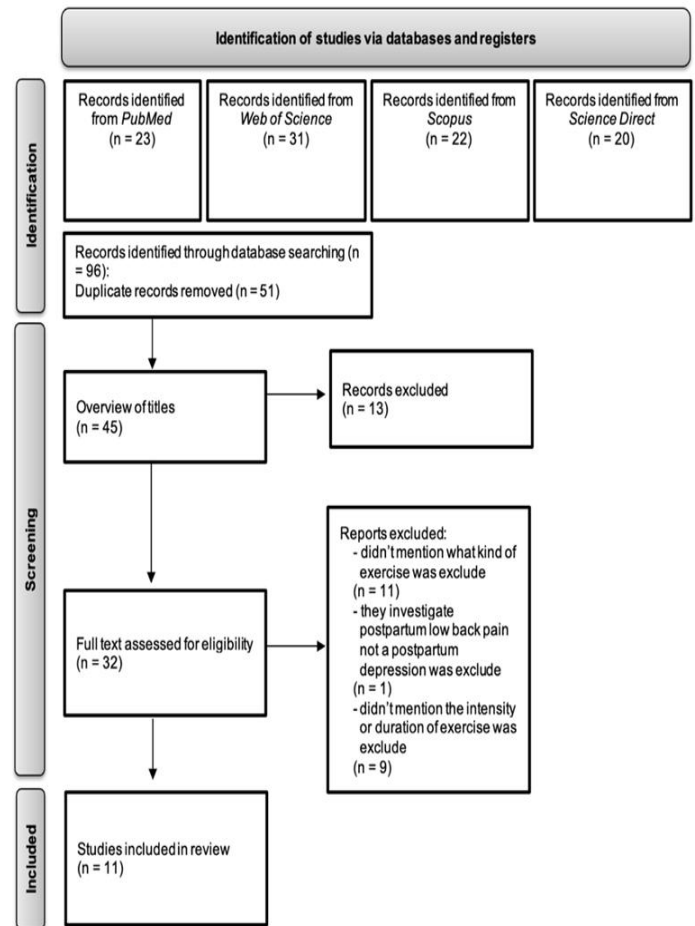


Figure 1: PRISMA flowchart of the article selection process

Results

Article search in the journal database was conducted in October 2024. 96 articles were found through a keyword search. After excluding similar articles, there were 45 articles reviewed by title, and 13 irrelevant articles were found, leaving 32 articles reviewed in full. 11 articles that did not mention the type of exercise provided for the intervention were excluded; 1 article whose outcome was reducing postpartum low back pain was also excluded; and 9 articles that did not explain the intensity or duration of the exercise in the given intervention were excluded. A total of 11 articles were analyzed using RCT/Clinical Trial research designs that recommend the most effective types of exercise in preventing postpartum depression (Table 1)

Table 1: Summary of the design and intervention of the studies

Author	Design	Participants	Intervention	Outcome
Lewis et al. ⁹	Randomized Controlled Trial	n = 450	(1) Physical exercise equivalent to brisk walking with an intensity of 5 days/week for at least 30 minutes. (2) Conducted over 11 sessions, with increasing intensity over time with the goal of making physical exercise a habit. In addition to exercise interventions, trained health educators also assist in problem-solving for mothers to help reduce the impact of stressors during the postpartum phase.	After the intervention of physical exercise equivalent to brisk walking with an intensity of 5 days/week for 30 minutes, it showed a significant reduction in PPD at 6 months postpartum, with depression symptoms measured using <i>Edinburgh Postnatal Depression Scale</i> (EPDS) measurement tool on respondents.
Flor-Alemany et al. ¹⁰	Randomized Controlled Trial	n = 85	(1) Aerobic exercise (60 minutes/session and 3 times/week) (2) Moderate physical exercise according to standard exercise recommendations from the American College of Obstetricians and Gynecologists (60 minutes/session and 3x/week) To monitor the compliance of research respondents, a respondent companion is provided to ensure that the respondents consistently carry out the intervention. In the control group, respondents were advised to continue their activities as usual.	Establishing a PPD diagnosis using the EPDS measurement tool. After the intervention, no significant difference was found between the two groups ($p > 0.05$).
Broberg et al. ¹¹	Randomized Controlled Trial	n = 282	(1) Warm-up for 10 minutes (Borg RPE 7-10); (2) Endurance training on treadmills for 20 minutes. (3) Strength training for the back, abdomen, thighs, arms, and pelvic floor for 25 minutes. (4) Stretching and relaxation for 15 minutes In the control group, general antenatal care was also provided, but for pregnant women experiencing depression, interdisciplinary care was given according to the complaints experienced. Pregnant women in this group were also advised to exercise for at least 30 minutes every day during pregnancy.	There is a significant difference in the intervention group at 8 weeks postpartum.
Ramsey et al. ¹²	Randomized Clinical Trial	n = 99	(1) Video tutorial for physical exercises recommended directly by experts; the demonstration in the video is performed by a real postpartum mother and not a fitness instructor, making it more accurate in addressing various complaints. (2) Physical exercise has varying durations, ranging from 10, 20, and 30 minutes. All respondents in the intervention group were given monitoring bracelets to track the physical exercises performed during pregnancy.	Physical activity performed by postpartum mothers with depressive symptoms shows that the more frequently and regularly the mothers engage in physical activity, the more the depressive symptoms decrease at the 6-month follow-up after childbirth.
Broberg et al., ¹³	Randomized Control Trial	n = 282	(1) Warm up for 10 minutes. (2) Exercise bike for 20 minutes. (3) 15 minutes of stretching or relaxation. The control group received standard antenatal care from midwives or obstetricians with more frequent visit schedules to monitor the mother's depression symptoms, and during the visits, mothers were also advised to engage in physical activities as usual.	The intervention group had an average WHO-5 score of 2.0 (95% CI = 1.3 to 5.2, $P = .2$) during weeks 29-34. In the per-protocol analysis, women who attended more than 75% of the exercise sessions showed a significantly higher average WHO-5 score compared to the control group. The intervention group reported better psychological well-being than the control group, with an average difference of 5.5 (95% CI 1.0–10.1, $P = 0.04$).

Apostolopoulos et al. ¹⁴	Clinical Trial	n = 20	(1) Warm-up for 10 minutes (2) Pelvic Floor Muscle Training for 20 minutes (3) Stretching or cooling down for 15 minutes. The physical exercises provided are monitored by a midwife or obstetrician accompanying the mother and are conducted in groups to enhance the mother's social connection so she does not always feel alone, whereas the control group receives standard care also accompanied by a midwife and obstetrician.	The intervention group showed significant results in reducing the symptoms of depression experienced by mothers, and group physical activities have proven to be more effective in preventing PPD.
Kim and Hyun ¹⁵	Randomized Control Trial	n = 16	(1) Warm-up (Soft stretching and breathing) for 5 minutes (2) Main Exercise, consists of 3 levels: Level 1: (week 1-3) Half Squat, cat cow, donkey kick, etc. Level 2: (weeks 4-6) side lateral raise, kneeling push-up, leg side up; Level 3: (weeks 7-8) Half-lunge twist, squat, low impact down dog, leg side kick, etc. Main exercise is done for 30 minutes, 8-12 reps x 2 sets with 10 seconds rest between sets. (3) Stretching or cooling down (Total Body Stretching) for 5 minutes. The control group did not receive any Pilates physical exercise at all during the study.	After an 8-week intervention, the intervention group showed significant differences in EPDS, PSQI, and PSS compared to the control group. (EPDS: p=0.02; PSQI: p=0.015; PSS: p=0.115)
Garnæs et al. ¹⁶	Randomized Clinical Trial	n = 91	physical exercise 3 times a week, consisting of (1) 35 minutes of moderate-intensity physical exercise such as jogging/running and (2) 25 minutes of cooling down or stretching. This intervention was provided from pregnancy until delivery. Meanwhile, the control group was not given any physical exercise but was still advised to engage in physical activities as usual.	There is no significant difference between the intervention group and the control group in the EPDS results (p=0.55).
Gow et al. ¹⁷	Clinical Trial	n = 233	Respondents were only advised to engage in physical activities such as brisk walking/running for 20 minutes a day, without monitoring their adherence to the intervention.	After analysis, there was no significant difference between before and after the intervention was given. In this study, it was also found that pregnant women affected by the lockdown did not significantly impact the mothers' mental health. The EPDS scores of the mothers before and after the treatment showed no significant difference.
Ebrahimian et al. ¹⁸	Clinical Trial	n = 56	The exercise program provided over 8 weeks consists of swimming activities for 5 weeks before pregnancy and for 3 weeks during pregnancy, performed for a duration of 15 minutes in the first week (4-6 sessions). Then it increased in the following week to 20 to 30 minutes per day.	In this study, the level of depression was measured by the serotonin levels in the blood, which showed that after the intervention, the serotonin levels in the mother's blood decreased significantly. (F 1, 52 = 9.61, p=0.003).
Liu et al. ¹⁹	Randomized Controlled Trial	n = 70	The intervention group was given very light physical activity treatment, which involved walking for 10 minutes every day. Additionally, the intervention group also received 10 sessions of acupressure.	The results showed a significant difference in the decreased EPDS scores in the intervention group, along with a reduction in back pain after childbirth.

Effective Physical Exercise Compliance Prevents Postpartum Depression

Based on the selected articles that have been thoroughly analyzed, several types of physical exercises are recommended to be performed from pregnancy to prevent the occurrence of Postpartum Depression. After considering the 11 selected publications, the conclusion is that there are various aspects that maximize the effectiveness of physical exercise in reducing PPD, one of which is the respondent's adherence to performing physical exercise according to recommendations. According to the research¹⁰. The final results for postpartum mothers in the intervention group and the control group showed no significant difference. Upon further analysis, it was found that the factor of maternal compliance in performing the physical exercises recommended by the Midwife/Obstetrician/Physiotherapist was not done correctly, with only 50% of the total respondents not adhering to the given recommendations.

Other studies have specific methods to monitor respondents in performing physical exercises according to recommendations. In the research¹², using the help of a monitoring bracelet used by respondents to track the movements they have performed; if they are not correct, the accompanying physiotherapist will remind the respondents. Research¹⁵ also implements strict respondent compliance monitoring methods, namely the recommended online pilates program is conducted through Real-time Zoom Meetings, consisting of:

Warm-up (Soft stretching and breathing) for 5 minutes

Main Exercise, consists of 3 levels:

Level 1: (week 1-3) Half Squat, cat cow, donkey kick, etc.

Level 2: (week 4-6) side lateral raise, kneeling push-up, leg side up;

Level 3: (week 7-8) Half-lunge twist, squat, low impact down dog, leg side kick, etc.

Main exercise done for 30 minutes, 8-12 reps x 2 set 10 sec rest between sets.

Stretching or cooling down (Total Body Stretching) for 5 minutes.

Thus, the respondents can carry out the training program above according to the advice and recommendations of the experts.

Enforcement of Postpartum Depression Diagnosis

All experts from the American College of Obstetricians and Gynecologists (ACOG), American Academy of Pediatrics (AAP), and American Academy of Family Medicine (AAFP) recommend that every patient experiencing PPD undergo screening using the Edinburgh Postnatal Depression Scale (EPDS)²⁰. The PPD test must be done correctly during pregnancy and after childbirth²¹. Other screening tools are also available, but the EPDS, a ten-item questionnaire filled out by patients in a few minutes, is the most common and accurate^{22,23}. If the score is more than 13, it is associated with a higher likelihood of becoming PPD, and additional clinical assessment is required^{5,24}. The clinical evaluation aims to discover other mental diseases, determine the risk of suicide and homicide, and provide a diagnosis²⁵. Based on the 11 articles that were analyzed in total, all of them used the EPDS to screen for the presence of depression in mothers

Types and Intensity of Effective Physical Exercise

Compliance with physical exercise according to expert recommendations is an important factor in preventing PPD more

effectively²⁶. Additionally, attention should also be paid to the type, intensity, and duration of physical exercise to effectively prevent PPD²⁷. In this systematic review, there are 11 articles that apply various types of physical exercises. Research⁹ providing treatment to respondents in the form of brisk walking exercises with an intensity of 5 days/week for at least 30 minutes/day, the treatment was given and directly monitored by a trained health educator, in this study the exercise started when postpartum mothers had a history of EPDS > 7 during pregnancy, significant differences were found between the control group and the treatment group.

Aerobic exercise performed according to ACOG recommendations was also applied in several studies in this systematic review²⁸. Aerobic exercise consists of three main movements: a 10-minute warm-up; endurance training, pelvic strength training, and basic pelvic exercises for 25 minutes; and stretching for 15 minutes, with an exercise intensity of 60 minutes/session, 3 times/week, regularly performed since the pregnancy enters the second trimester, has been proven to prevent the occurrence of PPD.¹⁴

Other types of physical exercise such as swimming, pilates, and treadmill, which have been done regularly since the second trimester of pregnancy, have all been proven to prevent or reduce the risk of PPD in postpartum mothers^{15,18,11}.

Discussion

This systematic review aimed to examine the effectiveness of exercise interventions considering duration, intensity, and type of activity in preventing postpartum depression (PPD). The collective findings suggest that structured physical activity serves as a promising, non-pharmacological strategy to mitigate depressive symptoms during the perinatal period²⁹.

Postpartum depression impacts roughly one in seven women worldwide, constituting a substantial maternal health issue with considerable psychological ramifications for both mother and child³⁰. The etiology of PPD is multifaceted, encompassing intricate interactions among hormonal variations, genetic susceptibility, and psychosocial stressors³¹. The swift decrease in estrogen and progesterone following childbirth interferes with neurochemical control and may render susceptible women prone to mood dysregulation³⁰. Sleep deprivation, caregiver stress, and social isolation all contribute to an increased emotional burden. Despite its ubiquity, up to half of PPD cases go undetected due to stigma and underreporting of psychiatric symptoms³². These considerations emphasize the critical need for preventive, accessible, and holistic therapies like exercise⁶.

The majority of participants in the 11-research analyzed were women with a history of depression, highlighting the findings' relevance to high-risk populations. Consistent with the anticipated processes, multiple studies indicated that exercise programs were related with significant decreases in depressed and anxious symptoms, confirming the notion that physical activity provides both physiological and psychological benefits³³. Exercise increases the production of endorphins and serotonin, aids sleep regulation, and lowers systemic inflammation, all of which help to stabilize mood. Psychologically, it promotes self-efficacy, a sense of control, and better body image as protective factors against depression in the postpartum period.

Women who exercised for an average of 121 minutes per week had significantly lower depression scores on the Structured Clinical Interview for DSM Disorders (SCID) at six and nine months postpartum than those in the control group⁹. These findings highlight the potential of moderate-intensity exercise, consistent with current global recommendations, to alleviate depressed symptoms. Furthermore, programs with group or supervised sessions found to be particularly successful, implying that social involvement improves adherence and emotional resilience. The combination of physical activity and friend support may be especially beneficial during the socially isolating postpartum era.

Aerobic activity was repeatedly found to be the most beneficial mode of exercise. Studies conforming to the American College of Obstetricians and Gynecologists (ACOG) standards revealed that regular aerobic activity such as brisk walking, swimming, or low-impact dance began during pregnancy and continuing after greatly reduced the incidence of depression³⁴. Mind-body therapies also proved effective. Kim and Hyun¹⁵ found that women who started Pilates for eight weeks in the second trimester showed substantial reductions in depression (EPDS, $p = 0.02$), sleep quality (PSQI, $p = 0.015$), and perceived stress (PSS, $p = 0.115$). Group-based Pilates offered additional social reinforcement and emotional support, reflecting the psychosocial aspect of exercise involvement.

Nonetheless, not every study found significant effects. Several investigations found modest or no reductions in depressed symptoms, even when regular exercise routines were included. These differences are most likely due to variances in adherence, timing of intervention beginning, and contextual factors. Women who face socioeconomic difficulties, single parenthood, or a lack of familial support may find it difficult to stick to suggested exercise routines, limiting the efficiency of interventions. Fatigue, childcare obligations, and competing household needs all contribute to noncompliance, underscoring the importance of designing adaptable, family-inclusive exercise programs that address the reality of postpartum living.

The significant heterogeneity across study designs complicates direct comparison and meta-analytic synthesis. Interventions ranged in frequency (two to five sessions per week), intensity (gentle stretching to moderate aerobic activity), duration (four to sixteen weeks), and level of supervision (self-directed versus instructor-led). Outcome measurements varied, with some research utilizing the EPDS and others using the SCID, PSQI, or Beck Depression Inventory (BDI). The variety of evaluation instruments adds measurement bias, which may account for differing effect sizes. Furthermore, baseline risk varies from severely depressed individuals to healthy, low-risk mothers, affecting generalizability.

To improve methodological rigor, future research should use standardized protocols and measurement tools. The incorporation of biological markers like as cortisol levels, inflammatory cytokines, or neuroimaging results could potentially help to improve understanding of exercise's processes in the prenatal setting.

Clinically, including exercise into routine prenatal and postnatal care is a viable, low-cost preventive intervention. Midwives and nurses play critical roles in encouraging physical activity through education, counseling, and follow-up care. Encouraging moderate, fun, and safe activities tailored to women's preferences and abilities can improve

adherence. Hospitals and community health centers could start postpartum exercise groups or mother-baby fitness sessions to combine physical and emotional healing.

Policymakers should also understand the societal importance of preventive maternal mental health interventions. Investing in exercise-based therapies can lower the healthcare expenditures associated with untreated PPD while also improving maternal-infant bonding, breastfeeding results, and overall family well-being. Intersectoral coordination among healthcare providers, public health authorities, and community organizations is critical to ensuring access and sustainability.

Strengths and Limitations

This systematic review has the advantage of using only Randomized Control Trials, which remove false causality and are therefore regarded the most reliable scientific evidence.

Structured physical exercise can be considered a safe, low-cost adjunct to prevent the occurrence of Postpartum Depression in mothers, as evidenced by 11 articles in this systematic review. However, the limitation of this research is the presence of bias in the reviewed articles and the lack of recent studies to minimize the existing bias. Such as the respondents' adherence to the exercises, which should have been anticipated.

Conclusion

This review suggests Regular physical exercise beginning in pregnancy appears to reduce the risk of postpartum depression by enhancing endorphin release, improving maternal self-image, and providing social support when done in groups. While encouraging, the evidence is not consistent; some studies report minimal effects, and variations in population, intervention type, and adherence limit firm conclusions. Structured exercise might be regarded a safe and low-cost addition to maternity care. To better understand the function of exercise in reducing postpartum depression, future research should use standardized protocols, investigate factors that influence effectiveness, and report both positive and null result

Funding

There was no financial support from any institution or group for this study.

Conflict of Interest

The authors declare that they have no conflicts of interest.

Data availability

All data generated or analyzed for this systematic review, including search strategies, extracted datasets, PRISMA documentation, and risk-of-bias assessments, are available from the corresponding author upon reasonable request. This supports transparency and reproducibility in accordance with KCMJ and international best practices.

Author Contributions

All authors contributed equally to the conception of the review, literature search, data interpretation, manuscript drafting, and final approval of the paper.

All authors meet the ICMJE criteria for authorship and agree to be accountable for all aspects of the work.

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