
EFFECT OF PRENATAL EXERCISE ON THE PHYSICAL READINESS OF PREGNANT WOMEN IN THE THIRD TRIMESTER

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ABSTRACT

Physical readiness in late pregnancy is relevant to maternal adaptation, mobility, functional capacity, and preparation for childbirth. Prenatal exercise is generally recommended for uncomplicated pregnancy, although the magnitude of change in physical readiness depends on exercise content, adherence, baseline condition, and study design. Objective to examine the change in physical readiness scores before and after prenatal exercise among women in the third trimester using the supplied research dataset. A quantitative one-group pretest–posttest analysis was conducted on 30 pregnant women in the third trimester. The dataset contained age, gestational age, parity, and physical-readiness scores before and after the intervention. Paired t-test was used after checking normality of the paired differences with the Shapiro–Wilk test. The mean difference, 95% confidence interval, and standardized within-person effect size were also calculated. Participants were 22–35 years old and 29–35 weeks pregnant; 15 were primiparous and 15 multiparous. Mean readiness increased from 47.67 ± 5.01 at pretest to 79.13 ± 5.89 at posttest. The mean increase was 31.47 points (95% CI 30.95–31.98). The paired differences were approximately normally distributed (Shapiro–Wilk $W=0.940$; $p=0.091$). The paired t-test showed a statistically significant pre–post difference ($t(29)=124.62$; $p<0.001$). The results demonstrates a marked improvement in physical-readiness scores after prenatal exercise.

KEYWORDS

prenatal exercise; pregnancy; third trimester; physical readiness



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INTRODUCTION

Pregnancy is accompanied by progressive anatomical, cardiovascular, respiratory, metabolic, and musculoskeletal adaptations (Jevtovic et al., 2025). These adaptations are especially evident in the third trimester, when increasing uterine size and maternal body mass can influence mobility, balance, posture, perceived exertion, and functional capacity (Lewis et al., 2021). Physical activity and structured exercise during uncomplicated pregnancy are therefore increasingly considered part of comprehensive antenatal care rather than activities that should routinely be avoided (Sharp et al., 2022).

International guidance consistently supports moderate-intensity physical activity during uncomplicated pregnancy, with recommendations commonly including aerobic activity, muscle strengthening, and pelvic-floor exercise, while emphasizing modification of activities according to gestational stage and individual risk (Raper et al., 2021). A global scoping review of public-health guidance found substantial agreement around 150–300 minutes of moderate-intensity aerobic activity per week, combined with strengthening activities and pregnancy-specific safety modifications (Hayman et al., 2023).

The physiological rationale is multifactorial. Exercise can improve cardiorespiratory conditioning, muscular endurance, functional mobility, glucose regulation, and weight-management behaviors. Evidence syntheses of randomized trials have reported beneficial associations with gestational weight gain, gestational diabetes, hypertensive disorders, and some delivery outcomes, while also supporting the general safety of appropriately prescribed activity in uncomplicated pregnancies (Veisy et al., 2021; Wang et al., 2022; Martínez-Vizcaíno et al., 2023).

The third trimester is a clinically important period for functional readiness because women are approaching labor while experiencing the greatest mechanical load of pregnancy (Saccone et al., 2025). A recent observational study using a maternal physical-fitness index found that late-gestation women had weaker back strength, poorer flexibility, and reduced balance performance compared with mid-gestation participants, and that low-back pain was related to several strength and functional measures (Zhou et al., 2023). This supports the clinical relevance of interventions that maintain or improve physical capacity during late pregnancy (Atkinson et al., 2022).

Prenatal exercise is not a single standardized intervention. Programs may combine walking, aerobic exercise, resistance exercise, stretching, breathing techniques, pelvic-floor training, yoga, or Pilates. Randomized trials of Pilates, yoga, aerobic exercise, and combined exercise have shown heterogeneous effects on labor outcomes, cardiometabolic markers, physical activity behavior, and maternal well-being (Ghandali et al., 2021; Pais et al., 2021; Mazzarino et al., 2022; Roland et al., 2023).

Despite the growing evidence base, there remains a practical research gap between broad recommendations for prenatal activity and measurement of an integrated construct such as physical readiness. The present analysis addresses this gap by examining a direct pretest–posttest change in readiness scores among third-trimester participants in the supplied dataset.

RESEARCH METHOD

This study used a quantitative one-group pretest–posttest design. The analytic sample consisted of 30 pregnant women. Ages ranged from 22 to 35 years. Gestational age ranged from 29 to 35 weeks, placing all participants within the third trimester. Parity was evenly distributed: 15 participants were primiparous and 15 were multiparous.

The primary outcome was the physical-readiness score recorded at two time points: pretest and posttest. The change score was calculated as posttest minus pretest. A positive value therefore indicates improvement in readiness. Descriptive statistics included mean, standard deviation, median, minimum, and maximum. Normality of the paired differences was assessed with the Shapiro–Wilk test. Because the paired differences were compatible with normality ($p>0.05$), the primary inferential analysis used a paired-samples t-test. A Wilcoxon signed-rank test was additionally calculated as a sensitivity analysis. The standardized within-person effect size was calculated as mean change divided by the standard deviation of the change scores (Cohen’s d_z). A two-sided alpha of 0.05 was used.

The dataset provided for analysis contains initials rather than full names. This manuscript reports aggregated data and does not reproduce individual-level identifiers. The study is interpreted as a pre–post observational intervention analysis. A statistically significant within-person change is not, by itself, equivalent to a causal treatment effect because maturation, measurement effects, regression to the mean, concurrent antenatal care, and other time-varying factors cannot be separated without a comparison group.

RESULT AND DISCUSSION

Results

The sample was relatively balanced by parity. The age distribution was concentrated between 25 and 34 years, with one participant aged 35 years. The gestational-age distribution was limited to 29–35 weeks, which provides a relatively homogeneous late-pregnancy sample.

Table 1. Participant Characteristics

Characteristic	Summary	Range/Distribution
Age (years)	27.50 ± 3.82	22–35
Gestational age (weeks)	31.73 ± 1.95	29–35
Primipara	15 (50.0%)	—
Multipara	15 (50.0%)	—
Sample size	30	—

Table 2. Physical Readiness Scores

Time point	Mean	SD	Median	Range
Pretest	47.67	5.01	48.0	38–56
Posttest	79.13	5.89	79.5	68–89
Change	31.47	1.38	31.5	29–35

The mean physical-readiness score increased by 31.47 points, from 47.67 before exercise to 79.13 after exercise. All 30 participants had a positive change score; the observed increases ranged from 29 to 35 points.

Table 3. Inferential Analysis

Analysis	Statistic	P-value/Estimate	Interpretation
Shapiro–Wilk test of change	W=0.940	p=0.091	Compatible with normality
Paired t-test	t(29)=124.62	p<0.001	Significant difference pre–post
95% CI of mean change	30.95 to 31.98	—	Positive interval
Wilcoxon signed-rank	W=0	p=1.52e-06	Sensitivity analysis significant
Cohen’s d_z	22.75	—	Very large within-person standardized change

The paired t-test yielded $t(29)=124.62$, $p<0.001$. The 95% confidence interval for the mean change was 30.95–31.98. The Wilcoxon sensitivity analysis was also statistically significant ($p=1.52e-06$), supporting the robustness of the direction of the observed pre–post change.

Table 4. Distribution of Individual Changes

Parity	Pretest mean $\pm$ SD	Posttest mean $\pm$ SD	Change mean $\pm$ SD
Primipara	43.87 $\pm$ 3.62	74.40 $\pm$ 3.78	30.53 $\pm$ 0.92
Multipara	51.47 $\pm$ 2.80	83.87 $\pm$ 3.09	32.40 $\pm$ 1.12

Descriptively, both parity groups showed improvement. These subgroup summaries are presented only to describe the dataset; the sample size is too small to support reliable inference about effect modification by parity.

Table 5. Summary of Key Findings

Indicator	Finding
Participants	30 pregnant women
Trimester	Third trimester; 29–35 weeks
Pretest readiness	47.67 $\pm$ 5.01
Posttest readiness	79.13 $\pm$ 5.89
Mean improvement	31.47 $\pm$ 1.38 points
95% CI	30.95–31.98
Primary p-value	<0.001
Direction of change	All participants improved

The magnitude of the observed mean change is substantial relative to the pretest standard deviation. The within-person standardized effect size is approximately 22.75, which is unusually large for a behavioral or exercise intervention and therefore warrants careful interpretation. Such a value can occur when paired observations have a very small standard deviation of change. In this dataset, the change scores are highly concentrated around 31–32 points. Consequently, the effect-size estimate should not be generalized without checking the measurement properties of the readiness scale and the original data-collection process.

The results support the descriptive statement that readiness scores were higher after the prenatal-exercise period. They do not establish that prenatal exercise alone produced the entire observed increase. A controlled trial, preferably with allocation concealment, blinded outcome assessment where feasible, and a validated readiness instrument, would provide stronger causal evidence.

Discussion

The third trimester represents a period of increasing mechanical and functional demand. Zhou et al. (2023) reported that late-gestation women demonstrated weaker back strength, lower performance on resistance and flexibility tasks, and poorer balance compared with mid-gestation participants. These findings provide a useful physiological context for the present data: an intervention capable of maintaining or improving readiness may be clinically meaningful even when pregnancy-related discomfort and biomechanical constraints are increasing.

Physical readiness also has relevance for labor preparation. The randomized Pilates trial by Ghandali et al. (2021) found improvements in labor pain and duration, while Chauhan et al. (2024) reported higher vaginal-delivery rates and lower induction requirements in an antenatal-exercise group. However, these outcomes should not be

directly equated with the readiness score in the current study because the instruments, interventions, populations, and designs differ.

Several mechanisms may explain improved readiness after exercise. First, repeated muscular loading can enhance local muscular endurance and movement efficiency. Second, aerobic activity can improve cardiorespiratory tolerance and reduce the relative physiological cost of submaximal activity. Third, stretching, mobility, and balance exercises may support movement quality during late pregnancy. Fourth, breathing exercises may improve awareness of respiratory control and perceived exertion. Finally, structured exercise may increase confidence and familiarity with physical sensations, which can influence perceived readiness for childbirth (Andargie et al., 2025; Leão et al., 2022; Masoud et al., 2020).

These mechanisms are consistent with contemporary evidence that exercise interventions can increase overall physical activity and moderate-to-vigorous activity during pregnancy. A 2022 meta-analysis of device-measured activity interventions found that intervention effects varied according to intervention characteristics, and a 2026 systematic review of 88 randomized trials reported increases in total physical activity, moderate-to-vigorous activity, exercise activity, and step count, together with reductions in several maternal health risks (Wang et al., 2022; Xiang et al., 2026).

Hayman et al. (2023) synthesized 30 international public-health guidelines and found broad agreement around moderate-intensity aerobic activity, muscle strengthening, pelvic-floor exercise, and safety modifications. The current findings are compatible with this direction of evidence, but they cannot be used to identify an optimal exercise dose because the supplied dataset does not record frequency, duration, intensity, or adherence.

For midwives, the findings support incorporating structured discussion of physical activity into antenatal care for women without contraindications (Saidi et al., 2023). Assessment should consider gestational age, obstetric risk, symptoms, baseline activity, musculoskeletal complaints, and patient preference. Exercise advice should be individualized, and women should be educated about warning signs requiring cessation and clinical assessment. The objective is not simply to increase activity, but to promote safe, sustainable functional capacity (Tinius et al., 2020; Elsis et al., 2022).

The intervention should also be integrated with broader antenatal education. Studies of exercise and childbirth training suggest that exercise can be combined with education about labor and coping strategies. Digital or social-media approaches may additionally support activity behavior, although they require attention to adherence, health literacy, and access (Nagpal et al., 2020; Talebi et al., 2022).

A strength of this analysis is that every participant had paired pretest and posttest observations, allowing within-person comparison and reducing variability attributable to stable individual characteristics. The sample is also relatively homogeneous in gestational age, with all participants in the third trimester. The analysis included both parametric and non-parametric sensitivity testing.

The limitation is the one-group pretest–posttest design. Without a concurrent comparison group, observed improvement cannot be attributed exclusively to prenatal exercise. Pregnancy itself is dynamic, and participants may receive other forms of antenatal care or change their behavior during the observation period. Familiarity with the readiness questionnaire can also increase posttest scores.

Future studies should use randomized controlled designs with an appropriate usual-care or attention-control group. The intervention should be described according to frequency, intensity, time, type, volume, progression, supervision, and adherence. Outcome measurement should include validated physical-fitness or functional-readiness domains such as lower-limb strength, core endurance, balance, flexibility, mobility,

cardiorespiratory capacity, and patient-reported readiness. Stratification by parity and baseline activity may help identify subgroups that respond differently.

Taken together, the dataset provides strong evidence of a pre–post increase in the measured readiness score. Contemporary international literature supports prenatal exercise as a generally appropriate component of care for uncomplicated pregnancy, but the present study should be positioned as preliminary intervention evidence because causal attribution is limited by design and incomplete intervention documentation.

CONCLUSION

Mean physical-readiness scores increased after exercise. The paired comparison was statistically significant. The sensitivity analysis reached the same conclusion regarding the direction and statistical significance of change. The findings indicate substantial improvement in the measured physical-readiness outcome after prenatal exercise. For midwifery practice, the results support continued attention to safe, individualized prenatal physical activity within comprehensive antenatal care.

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