

# Maternal Leisure-time Physical Activity and Risk of Preterm Birth

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Public Health

## INTRODUCTION

Preterm birth (live delivery prior to 37 complete weeks of gestation) is a leading cause of infant death and regular physical activity may reduce the risk for preterm birth because of its beneficial effects on pregnancy complications such as preeclampsia, excessive weight gain, and gestational diabetes.

On average, however, pregnant women report lower levels of physical activity compared with those who are not pregnant.

Data from the 2013 National Health and Nutrition Examination Survey (NHANES) suggest that about 49% of adult women met the national physical activity recommendations by engaging in at least 150 minutes a week of moderate-intensity activity or 75 minutes a week of vigorous-intensity activity. In contrast, only 14% of pregnant women met those same recommendations. Moreover, women who were active prior to pregnancy tend to report that their physical activity level decreases once they became pregnant.

This systematic review examined low, moderate and vigorous leisure-time physical activity (LTPA) during pregnancy and the outcome of preterm birth.

## METHODS

The review considered studies published between 1984 and the end of 2014. The Population, Intervention, Comparison, and Outcome (PICO) method was used to guide the literature search with the following question 'What is the risk of preterm birth (outcome) for women (population) who engage in LTPA (intervention/exposure) during pregnancy compared with pregnant women who do not (comparison)?'

The methods were based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) Statement and the Centre for Reviews and Dissemination Systematic Reviews guidebook. A search of the Medline, Cochrane library, SPORTDiscus, CINAHL, and Scopus electronic databases was conducted in January 2015.

The following key words were used: **exercise, physical activity, leisure activity, sports, strength training, aerobic exercise, physical fitness, bicycling, walking, active commuting, transportation physical activity, active transportation, and occupation.** These keywords were combined with the additional keywords: **gestational age, preterm birth, premature birth, prematurity, infant, premature, pregnancy, pregnancy outcome, intrauterine environment, prenatal care, maternal fetal relations, and pregnant women.**

## RESULTS

The search of all five databases yielded a total of 1472 studies. The flowchart in **Figure 1** provides an overview of the process of identifying articles for final inclusion in the systematic review. After eliminating duplicate studies, 1197 records remained, and their titles were screened for relevance. Abstracts of the 186 studies with relevant titles were then evaluated for applicability, which resulted in a total of 107 studies initially considered eligible for inclusion in the review before the inclusion and exclusion criteria were applied. Studies were included in the review if they met all of the following criteria: (a) population: pregnant women; (b) intervention: leisure-time physical activity during pregnancy adequately measured as an exposure variable; (c) control group: no exercise reported during pregnancy; and (d) outcome: information about gestational age at delivery.

There were 27 studies included in this review of which 23 received high quality reporting scores.

Figure 1-Overview of the PRISMA process

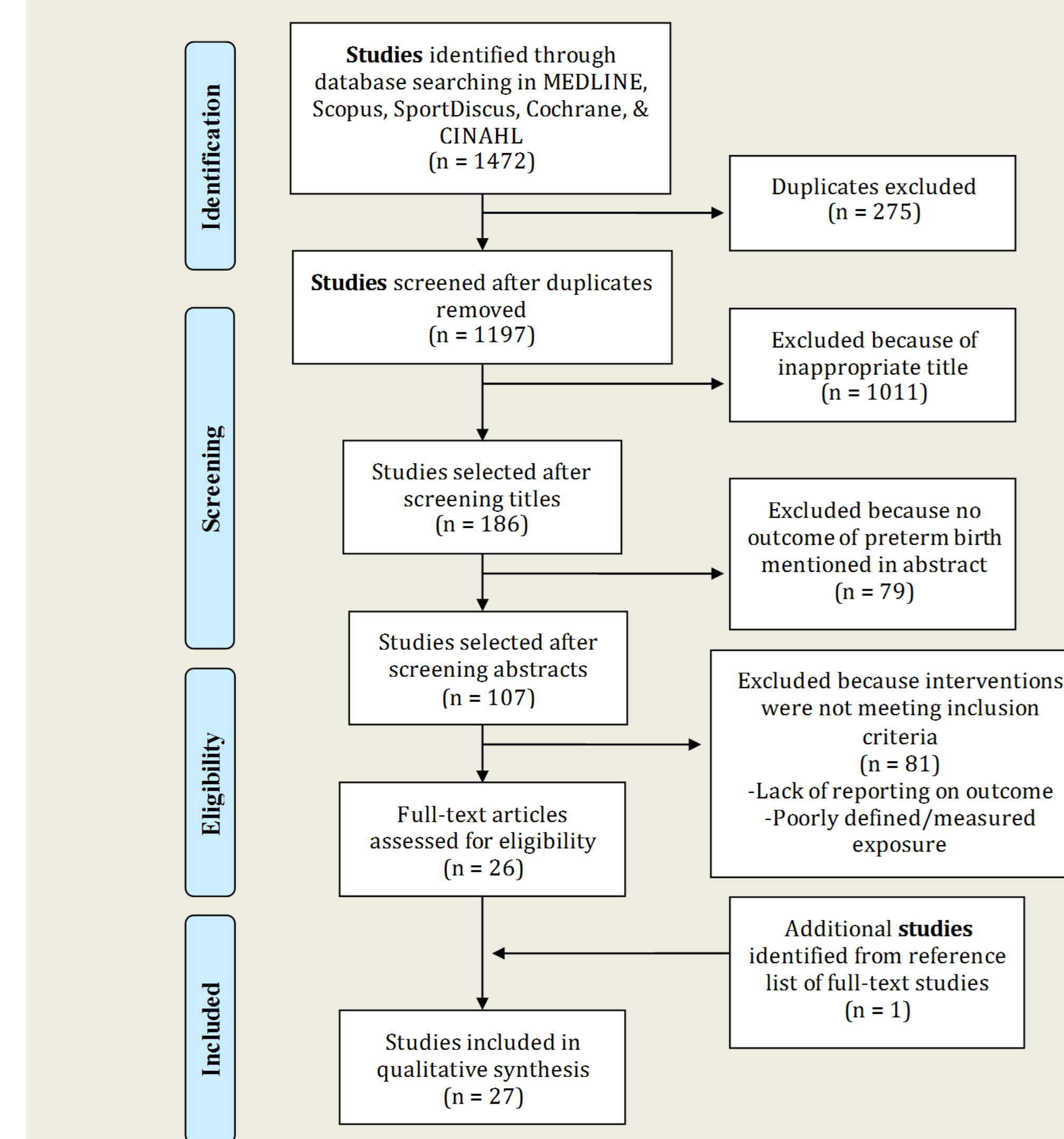
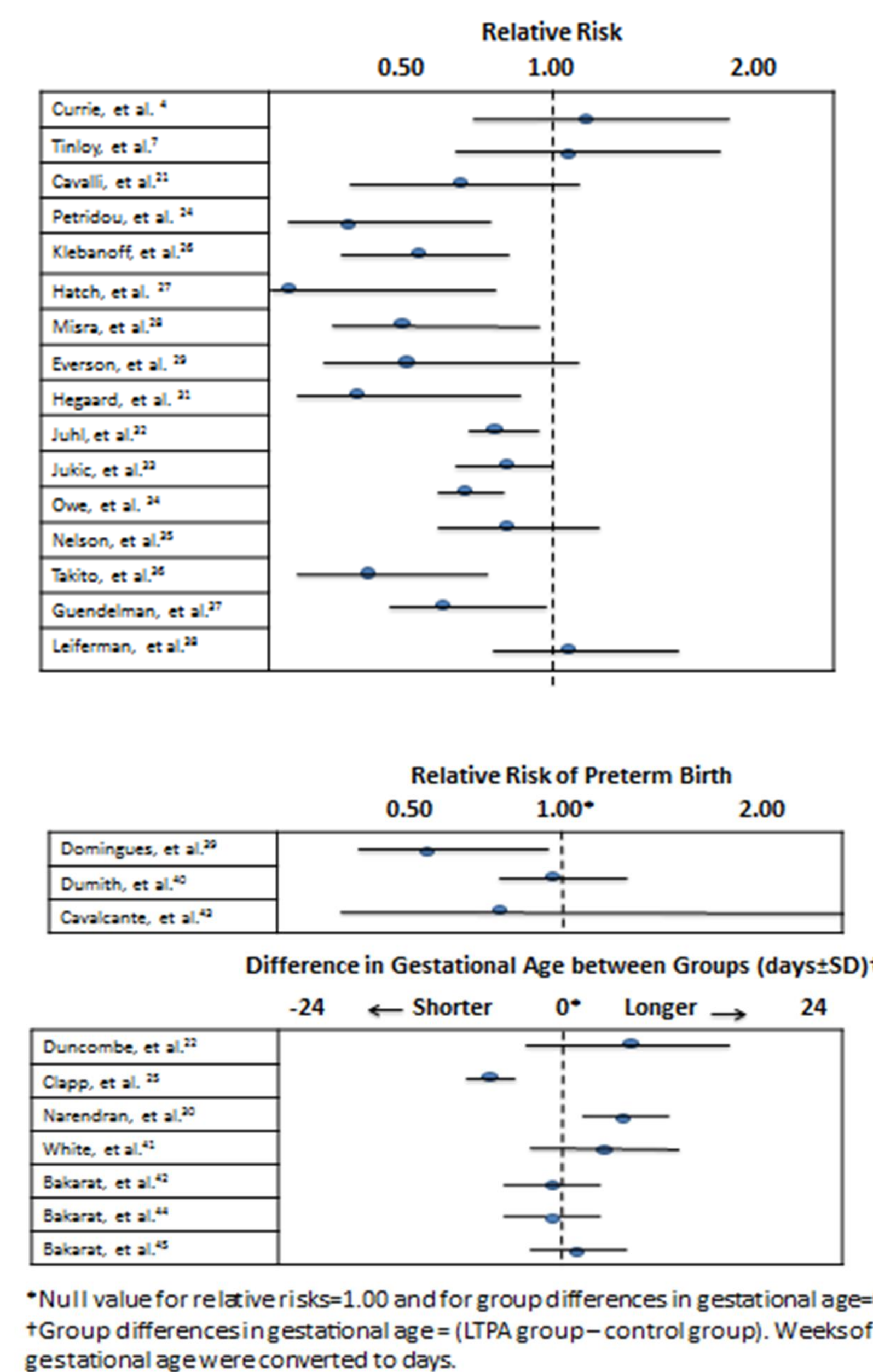


Figure 2. – Effect sizes for the relation between LTPA and preterm birth.



**STUDY QUALITY:** The Downs and Black checklist addressed study quality with a total of 27 questions in the following areas: reporting, internal validity (bias and confounding), external validity and statistical power. For each quality indicator, a study received 1 point for meeting the indicator, and 0 points if it did not. Randomized controlled trials (RCTs) could earn up to 28 total points, while non-RCTs could earn up to 22 total points. Only studies having scores that were greater than 67% of their maximal possible point values (i.e., ≥19 points for RCTs and ≥15 points for others) were considered high quality, based on protocols followed in previous reviews using the same checklist.

## RESULTS (con't)

A total of 13 studies reported a significant protective effect of LTPA on the risk of preterm birth. Of these studies, 12 were rated as high quality studies. Physical activity of both moderate and vigorous levels were associated with a lower risk of preterm birth, with relative risk estimates ranging from 0.08 to 0.90 (**Figure 2**).

In general, the protective benefits of LTPA were greater for women reporting more vigorous LTPA, compared with those reporting moderate levels. Low-intensity activity was also significantly associated with a lower odds of preterm birth, provided the duration of such activity was ≥8hr/day at weeks 23-26 (OR=0.56, 95% CI=0.36, 0.87) or >20min/day during the second trimester (aOR=0.36, 95% CI=0.16, 0.78).

Frequency of LTPA was also associated with protective findings, as those who reported engaging in activity more than 3 times per week experienced a lower risk of preterm delivery compared with those who engaged less frequently.

Thirteen of the studies reviewed reported null associations between LTPA and risk of preterm birth, and 11 of these studies met criteria for high quality. Only two studies reported either a significantly shorter gestational age (weeks) or a higher risk of preterm birth with maternal physical activity.

## SUMMARY

The relation between maternal physical activity and birth outcome may best be represented by a U-shaped curve, in which no physical activity and prolonged, intensive physical activity both exert a negative effect.

The mechanisms for the protective effects of LTPA on birth outcome include a reduction in inflammation and oxidative stress on maternal and placental endothelial tissue, and a concentration of maternal and fetal hemoglobin, which then improves the transport and diffusion of the hemoglobin through the placenta.

The new American College of Obstetrics and Gynecology (ACOG) recommendations for physical activity and exercise during pregnancy state that "physical activity in pregnancy has minimal risks and has been shown to benefit most women, although some modifications to exercise routines may be necessary because of normal anatomic and physiologic changes and fetal requirements".

## CONCLUSIONS

This systematic review of literature provides additional evidence to support the assertion that healthy pregnant women can engage in low, moderate, and even some vigorous levels of LTPA without risk for preterm birth – and this may be especially so for women engaged in this level of activity on a regular basis prior to conception.

Clinicians should encourage all healthy women to follow the ACOG recommendations for LTPA during pregnancy.