# Supplemental Online Content

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This supplemental material has been provided by the authors to give readers additional information about their work.

## eTable 1. A list of activities with a MET value of 3.

| |
|---|
| **Walking** |
| Walking, 2.5 mph, firm, level surface |
| Walking, treadmill, 2.0 to 2.4 mph (3.2 to 3.9 km/h), 0% grade |
| **Home activity** |
| Vacuuming, general, moderate effort |
| Making bed, changing linens |
| Sweeping garage, sidewalk, or outside house |
| Implied walking, putting away household items, moderate effort |
| Walking and carrying small child, child weighing 15 lbs or more |
| Elder care, disabled adult, bathing, dressing, moving into and out of bed, only active periods |
| **Lawn and garden** |
| Walking, gathering gardening tools |
| Walking, applying fertilizer or seeding a lawn, push applicator |
| Implied walking/standing – picking up yard, light, picking flowers or vegetables |
| Walking, gathering gardening tools |
| **Conditioning exercises** |
| Body weight resistance exercises (e.g., squat, lunge, push-up, crunch), general |
| Yoga, Hot |
| **Dancing**: waltz, foxtrot, slow dancing, samba tango, rumba, 19th century dance, mambo, cha cha |

**eTable 2. Reasons for medically indicated preterm births.**

| Patient ID | Conditions |
|---|---|
| 1 | In vitro fertilization baby, hypertension, abnormal fetal position, thrombophilia |
| 2 | Preeclampsia |
| 3 | Preeclampsia |
| 4 | Premature rupture of membranes, fetal distress |
| 5 | Cholestasis |
| 6 | Cord around the body and fetal arrhythmia |
| 7 | Abnormal fetal position |
| 8 | Other maternal systemic diseases |
| 9 | Fetal distress, other maternal systemic diseases |
| 10 | Fetal distress |
| 11 | Cholestasis, in vitro fertilization baby |
| 12 | Cholestasis |
| 13 | Preeclampsia |
| 14 | Cholestasis |
| 15 | Other maternal systemic diseases, in vitro fertilization baby |
| 16 | Preeclampsia |
| 17 | Abnormal fetal position, other maternal systemic diseases |
| 18 | Premature rupture of membranes, other maternal systemic diseases |
| 19 | Preeclampsia |
| 20 | Other maternal systemic diseases |
| 21 | Preeclampsia |

**eTable 3. Comparison of baseline characteristics between participants with higher and lower moderate-to-vigorous-intensity physical activity in our study.**

| | Patients, No (%) | |
|---|---|---|
| | MVPA< 78.6 min / day [a] | MVPA≥ 78.6 min / day |
| Characteristic | n=714 | n=713 |
| Age, mean (SD), years | 31.23 (3.89) | 31.28 (3.80) |
| Gestational week at baseline, mean (SD), weeks | 25.98 (2.01) | 25.75 (1.74) |
| Pre-pregnancy BMI, mean (SD), $kg/m^2$ | 22.26 (3.43) | 22.24 (3.70) |
| Primiparity | 458 (64.1%) | 453 (63.5%) |
| Pregnant with preeclampsia | 22 (3.1%) | 14 (2.0%) |
| Pregnant with medication treatment | 6 (0.4%) | 9 (0.8%) |
| Pregnant with history of preterm birth | 10 (1.4%) | 8 (1.1%) |
| Education | | |
| ≤ High school or vocational school | 73 (10.2%) | 92 (12.9%) |
| University or professional school | 546 (76.5%) | 506 (71.0%) |
| > University | 95 (13.3%) | 115 (16.1%) |
| Household income, ¥/year | | |
| < 100,000 | 164 (23.0%) | 175 (24.5%) |
| 100,000 – 200,000 | 273 (38.2%) | 280 (39.3%) |
| > 200,000 | 277 (38.8%) | 258 (36.2%) |
| Current smoking | 30 (4.2%) | 21 (2.9%) |
| Current drinking | 22 (3.1%) | 21 (2.9%) |
| After COVID recruitment | | |
| No | 97 (13.6%) | 127 (17.8%) |
| Yes | 617 (86.4%) | 586 (82.2%) |

Abbreviations: MVPA, Moderate-to-Vigorous Intensity Physical Activity.

[a] 78.6 is the median value of MVPA.

**eTable 4. Comparison of baseline characteristics between participants included and those excluded in our study.**

| | Patients, No (%) | |
|---|---|---|
| | Included | Excluded |
| Characteristic | n=1,427 | n=475 |
| Age, mean (SD), years | 31.3 (3.8) | 30.82 (3.72) |
| Gestational week at baseline, mean (SD), weeks | 25.9 (1.89) | 26.03 (1.96) |
| Pre-pregnancy BMI, mean (SD), kg/m$^2$ | 22.3 (3.6) | 21.92 (3.65) |
| Primiparity | 911 (63.8%) | 331 (69.7%) |
| Pregnant with preeclampsia | 36 (2.5%) | 12 (2.5%) |
| Pregnant with medication treatment | 15 (1.1 %) | 2 (0.42%) |
| Pregnant with history of preterm birth | 18 (1.3%) | 0 (0) |
| Education | | |
| ≤ High school or vocational school | 164 (11.5%) | 58 (13.6%) |
| University or professional school | 1053 (73.8%) | 318 (74.5%) |
| > University | 210 (14.7%) | 51 (11.9%) |
| Household income, ¥/year | | |
| < 100,000 | 339 (23.8%) | 63 (19.7%) |
| 100,000 – 200,000 | 552 (38.7%) | 122 (38.2%) |
| > 200,000 | 536 (37.6%) | 134 (42.0%) |
| Current smoking | 50 (3.5%) | 28 (6.6%) |
| Current drinking | 43 (3.0%) | 10 (2.3%) |
| After COVID recruitment | | |
| No | 224 (15.7%) | 101 (21.3%) |
| Yes | 1,203 (84.3%) | 374 (78.7%) |

**eTable 5. Association of the fraction of moderate-to-vigorous intensity physical activity from the physical activity energy expenditure with preterm birth stratified by the median age of participants.**

| Age | No. of preterm cases / total No. | OR (95% CI) | $P_{interaction}$=0.047 |
|---|---|---|---|
| <31 years | 31 / 714 | 0.78 (0.53 - 1.16) | |
| ≥31years | 49 / 713 | 0.68 (0.50 - 0.91) | |

Logistic regression was used to estimate the odds rations and 95% CI for preterm birth per standard deviation change in the fraction of moderate-to-vigorous intensity physical activity from the physical activity energy expenditure, adjusting for age, gestational week at baseline, pre-pregnancy BMI, household income, educational level, smoking, alcohol drinking and parity.

**eTable 6. Sensitivity analyses of associations between physical activity and preterm birth.**

| Model | No. of preterm cases / total No. | MVPA, min / day | FMVPA, % | PAEE, kJ kg–1 day–1 |
|---|---|---|---|---|
| OR, multivariable-adjusted [a] | 80 / 1427 | 0.64 (0.42 - 0.98) | 0.69 (0.55 - 0.88) | 0.86 (0.68 - 1.09) |
| OR, multivariable-adjusted, including wear time as additional covariate | 80 / 1427 | 0.64 (0.42 - 0.98) | 0.69 (0.55 - 0.88) | 0.86 (0.68 - 1.10) |
| OR, multivariable-adjusted, including recruited period as additional covariate | 80 / 1427 | 0.65 (0.42 - 0.98) | 0.69 (0.55 - 0.88) | 0.85 (0.67 - 1.08) |
| OR, multivariable-adjusted, excluding participants with accelerometer wear time less than 5 days | 80 / 1403 | 0.64 (0.41 - 0.98) | 0.70 (0.55 - 0.89) | 0.87 (0.69 - 1.10) |
| OR, multivariable-adjusted, excluding participants who were advised by their doctors to undergo bed rest to maintain their pregnancy | 79 / 1411 | 0.62 (0.40 - 0.95) | 0.70 (0.55 - 0.89) | 0.87 (0.69 - 1.10) |
| OR, multivariable-adjusted, excluding the twins and other multiples pregnant participants | 71 / 1411 | 0.61 (0.39 - 0.95) | 0.77 (0.60 - 0.98) | 0.96 (0.74 - 1.23) |
| OR, multivariable-adjusted, including history of preterm birth as additional covariate | 80 / 1427 | 0.65 (0.42 - 0.99) | 0.71 (0.56 - 0.89) | 0.86 (0.68 - 1.09) |
| OR, including preeclampsia as additional covariate | 80 / 1427 | 0.65 (0.43 - 0.99) | 0.71 (0.56 - 0.90) | 0.87 (0.69 - 1.10) |
| OR, including medication for the treatment of GDM as additional covariate | 80 / 1427 | 0.65 (0.43 - 0.99) | 0.70 (0.55 - 0.88) | 0.86 (0.68 - 1.09) |
| OR, including occupation as additional covariate | 80 / 1427 | 0.62 (0.41 - 0.96) | 0.70 (0.55 - 0.89) | 0.88 (0.69 - 1.11) |
| Beta, gestational age at delivery as continuous outcome [b] | 80 / 1427 | 0.22 (0.09 - 0.36) | 0.17 (0.096 - 0.25) | 0.088 (0.0084 - 0.17) |

[a] Logistic regression was used to estimate the odds ratios and 95% CI for preterm birth for preterm birth per 30-minute increase in MVPA and per standard deviation change in FMVPA and PAEE. Covariates included in the multivariable-adjusted model were age, gestational week at baseline, pre-pregnancy BMI, PAEE (only for MVPA) household income, educational level, smoking, alcohol drinking and parity. PAEE: physical activity energy expenditure; MVPA: Moderate-to-Vigorous Intensity Physical Activity; FMVPA: fraction of PAEE from MVPA.

[b] Linear regression was used to estimate the beta and 95% CI for gestational age at delivery per 30-minute increase in MVPA and per standard deviation change in FMVPA and PAEE. The adjusted covariates were the same as those used in the logistic regression.

**eTable 7. Secondary analyses of associations between physical activity and preterm birth.**

| | No. of preterm cases / total No. | MVPA, min / day | FMVPA, % | PAEE, kJ kg–1 day–1 |
|---|---|---|---|---|
| Spontaneous preterm | 59 / 1406 | | | |
| OR, preterm birth as outcome | | 0.60 (0.36 - 0.98) | 0.73 (0.55 - 0.96) | 0.87 (0.66 - 1.15) |
| Beta, gestational age at delivery as outcome | | 0.21 (0.079 - 0.34) | 0.15 (0.073 - 0.22) | 0.076 (-0.0012 - 0.15) |
| Medically indicated preterm | 21 / 1367 | | | |
| OR, preterm birth as outcome | | 0.78 (0.36 - 1.70) | 0.61 (0.39 - 0.96) | 0.81 (0.52 - 1.28) |
| Beta, gestational age at delivery as outcome | | 0.099 (-0.0019 - 0.20) | 0.09 (0.03 - 0.15) | 0.05 (-0.02 - 0.11) |
| Moderate to late preterm | 74 / 1421 | | | |
| OR, preterm birth as outcome | | 0.71 (0.46 - 1.09) | 0.74 (0.58 - 0.94) | 0.88 (0.69 - 1.12) |
| Beta, gestational age at delivery as outcome | | 0.17 (0.047 - 0.30) | 0.14 (0.067 - 0.21) | 0.073 (-0.00038 - 0.15) |
| Very preterm | 6 / 1352 | | | |
| OR, preterm birth as outcome | | 0.17 (0.029 - 0.98) | 0.37 (0.16 - 0.87) | 0.62 (0.27 - 1.44) |
| Beta, gestational age at delivery as outcome | | 0.14 (0.029 - 0.25) | 0.098 (0.036 - 0.16) | 0.054 (-0.01 - 0.12) |

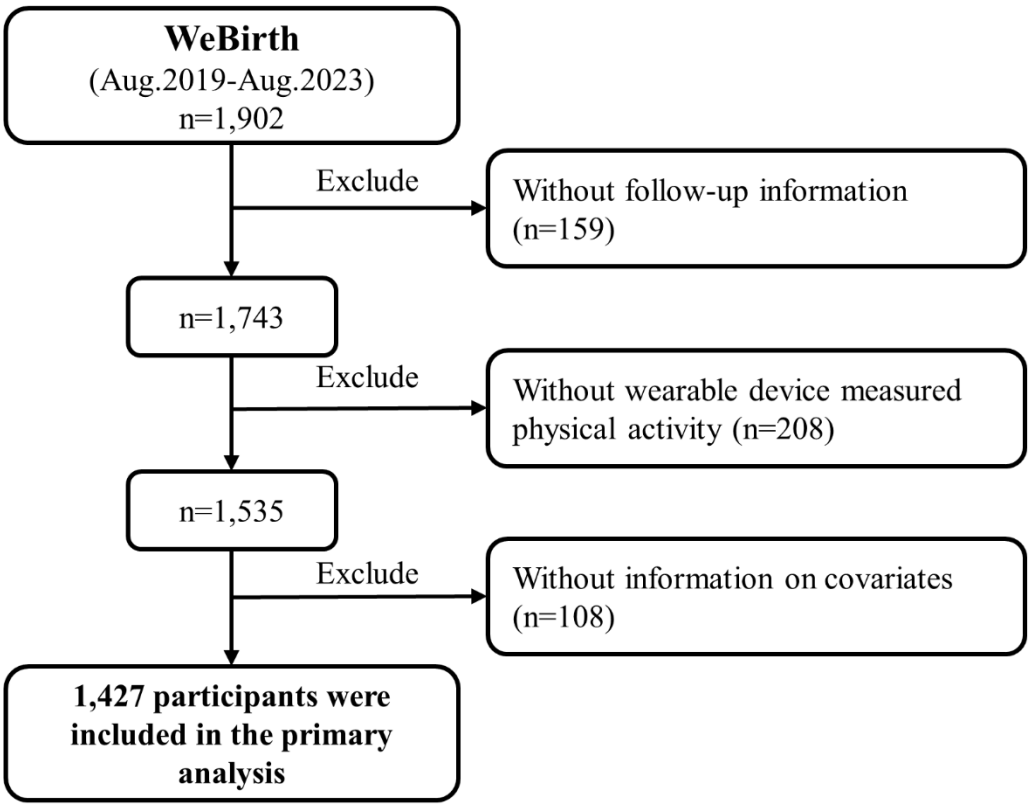
Logistic regression was used to estimate the odds ratios and 95% CI for preterm birth per30-minute increase in MVPA and per standard deviation change in FMVPA and PAEE. Linear regression was employed to estimate the beta coefficients and corresponding 95% CI for gestational week at delivery. Covariates included in the model were age, gestational week at baseline, pre-pregnancy BMI, PAEE (only for MVPA) household income, educational level, smoking, alcohol drinking and parity. PAEE: physical activity energy expenditure; MVPA: Moderate-to-Vigorous Intensity Physical Activity; FMVPA: fraction of PAEE from MVPA.

**eTable 8. Association of physical activity with preterm birth stratified by primiparity.**

| Primiparity | No. of preterm cases / total No. | MVPA, min / day | FMVPA, % | PAEE, kJ $kg^{-1}$ $day^{-1}$ |
|---|---|---|---|---|
| Yes | | | | |
| OR, preterm birth as outcome | 54 / 911 | 0.68 (0.40 - 1.17) | 0.67 (0.51 - 0.89) | 0.78 (0.58 - 1.04) |
| Beta, gestational age as outcome | 54 / 911 | 0.22 (0.039 - 0.40) | 0.19 (0.1 - 0.29) | 0.13 (0.02 - 0.23) |
| No | | | | |
| OR, preterm birth as outcome | 26 / 516 | 0.53 (0.26 - 1.07) | 0.75 (0.50 - 1.14) | 0.97 (0.66 - 1.44) |
| Beta, gestational age as outcome | 26 / 516 | 0.27 (0.066 - 0.46) | 0.14 (0.015 - 0.26) | 0.019 (-0.1 - 0.14) |

Logistic regression was used to estimate the odds ratios and 95% CI for preterm birth per 30-minute increase in MVPA and per standard deviation change in FMVPA and PAEE. Linear regression was employed to estimate the beta coefficients and corresponding 95% CI for gestational week at delivery. Covariates included in the model were age, gestational week at baseline, pre-pregnancy BMI, PAEE (only for MVPA) household income, educational level, smoking, alcohol drinking and parity. PAEE: physical activity energy expenditure; MVPA: Moderate-to-Vigorous Intensity Physical Activity; FMVPA: fraction of PAEE from MVPA.

**eFigure 1. Flowchart of study sample selection.** Abbreviations: WeBirth, Westlake Precision Birth Cohort.



**eFigure 2. Distribution of daily MVPA and its coefficient of variation among individuals with different active physical activity patterns.** Abbreviations: MVPA, moderate-to-vigorous-intensity physical activity.