

Is Gestational Weight Gain Status Associated with Device-Assessed Physical Activity and Sedentary Behavior at 6 months Postpartum?

Bethany Rand Hallenbeck^{1,2}, Susan D. Brown³, Assiamira Ferrara¹, Hillary Serrato Bandera¹, Matthew Buman⁴, Monique Hedderson¹, Sylvia E. Badon¹, Samantha Frances Ehrlich².

1 Kaiser Permanente Northern California, Division of Research; 2 University of Tennessee Knoxville, College of Education, Health, and Human Sciences; 3 University of California, Davis, School of Medicine; 4 Arizona State University, Phoenix, Arizona, College of Health Solutions

Kaiser Permanente
Research

Exceeding GWG guidelines was associated with lower sedentary time at 6 months postpartum. Associations between GWG and postpartum moderated to vigorous physical activity may differ by pre-pregnancy BMI.

Background

Excess gestational weight gain (GWG) is associated with long-term cardiometabolic risk, but little is known about association of GWG with postpartum physical activity (PA) and sedentary behavior (SED).

Purpose

To examine whether exceeding or gaining below the National Academy of Medicine (NAM) GWG guidelines predicted device-measured activity metrics at 6 months postpartum.

Methods



Sample Population

- 126 participants from the Pregnancy Environment and Lifestyle Study (PETALS) and PETALS-2 postpartum follow-up study.
- Diverse, population-based cohorts of pregnant Kaiser Permanente Northern California members.

Exposure: Gestational Weight Gain



- Clinic-measured weights repeatedly measured from pre-pregnancy to delivery.
- Categories created for “exceeds” vs “does not exceed” NAM guidelines, which is based on BMI category and total weight gain

Outcome: Device-Based PA and SED



- Participants wore ActiGraph wGT3X-BT monitors for 7 consecutive days at 6-months postpartum.
- Daily minutes of moderate-to-vigorous physical activity (MVPA), light physical activity (LPA), and SED for all valid days
 - Valid days defined as 600 or more minutes of wear time.
 - Participants with less than 4 valid days were excluded from analysis.

Statistical Analyses

- Unadjusted and covariate adjusted mixed effects models estimated associations of GWG categories and minutes of device-based postpartum MVPA, LPA, and SED. Regression estimates and 95% confidence intervals (CI) presented. Statistical significant $P < 0.05$
- Multiplicative interaction by pre-pregnancy BMI tested

Results: Exceeding (compared to not exceeding) GWG guidelines was associated with an average of 43 fewer minutes of daily SED. We found multiplicative interaction for pre-pregnancy BMI in the model assessing postpartum MVPA. After stratifying by pre-pregnancy BMI, there were no statistically significant associations observed between exceeding GWG guidelines and postpartum MVPA, though there was a suggestion of significance in the group with pre-pregnancy obesity (Estimate: 44.67, CI: -6.34, 95.68)

Table 2. Estimates of Exceeding vs Not Exceeding Gestational Weight Gain Guidelines with Device-Assessed Moderate to Vigorous Physical Activity (MVPA), Light-intensity Physical Activity (LPA), and Sedentary Time (SED) at 6 Months Postpartum

MVPA (min/day)		LPA (min/day)		SED (min/day)	
Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Estimate (95% CI)	Estimate (95% CI)	Estimate (95% CI)	Estimate (95% CI)	Estimate (95% CI)	Estimate (95% CI)
-2.7 (-20.0, 14.7)	3.2 (-15.2, 21.5)	6.2 (-15.2, 27.7)	11.5 (-12.3, 35.2)	-19.5 (-51.4, 12.4)	-43.3 (-76.5, -10.1)*

Statistically significant at $\alpha = 0.05$; models adjusted for age at delivery (continuous), pre-pregnancy BMI (continuous), education level (categorical), race and ethnicity (categorical), and gestational weight retention at 6-months postpartum (continuous and standardized to 25 weeks postpartum)

Table 3. Adjusted Estimates of Association Between Exceeding vs Not Exceeding Gestational Weight Gain Guidelines and Device-Assessed Moderate to Vigorous Physical Activity, Stratified by Pre-Pregnancy BMI

18-24.9 kg/m ²	25-29.9 kg/m ²	> 30 kg/m ²
Estimate (95% CI)	Estimate (95% CI)	Estimate (95% CI)
-14.22 (-42.22, 13.77)	23.21 (-13.65, 60.07)	44.67 (-6.34, 95.68) ^a

Models adjusted for: age at delivery, education level, and race and ethnicity, and gestational weight retention at 6-months postpartum (continuous and standardized to 25 weeks postpartum). 95% CI = 95% Confidence Interval. ^a $P=0.08$

Conclusion

Exceeding gestational weight gain guidelines may influence motivation to reduce sedentary behavior or increase physical activity. Future studies should examine longer-term patterns across the postpartum period, pair device data with contextual self-report data, and further examine potential differences in modifiable behavior engagement by BMI status.

Table 1. Characteristics of Analytic Sample at 6 Months Postpartum (N=126)

GWG Category	Does not Exceed Guidelines (n=69)	Exceeds Guidelines (n=57)
Age, median (IQR)	32 (30,36)	33 (29, 35)
Pre-pregnancy BMI, n (%)		
<=18.0	1 (1.4)	1 (1.7)
18.1-24.9	43 (60.9)	23 (40.3)
25.0-29.9	14 (20.3)	19 (33.3)
>=30.0	12 (17.4)	14 (24.6)
Postpartum Weight Retention, n (%)		
≤ 5 lbs from pre-pregnancy	54 (78.3)	24 (42.1)
> 5.1-20 lbs from pre-pregnancy	13 (18.8)	27 (47.4)
> 20.1 lbs from pre-pregnancy	2 (2.9)	6 (10.5)
Education Level, n (%)		
High School	20 (29.0)	17 (29.8)
Undergraduate	23 (33.3)	19 (33.3)
Graduate	26 (37.7)	21 (36.8)
Race and Ethnicity, n (%)		
Asian/Pacific Islander	20 (29.0)	11 (19.3)
Black	2 (2.9)	11 (19.3)
Hispanic/Latino	16 (23.2)	11 (19.3)
Multiracial	8 (11.6)	6 (10.5)
White	23 (33.3)	18 (31.6)
Moderate-to-Vigorous intensity PA, n (%)		
≤ 30 min/day	7 (10.1)	7 (12.3)
31-59 min/day	21 (30.4)	16 (28.1)
≥ 60 min/day	41 (59.4)	34 (59.6)
Light intensity PA, n (%)		
≤ 6 hr/day	30 (43.5)	19 (33.3)
> 6 hr/day	39 (56.5)	38 (66.7)
Sedentary behavior, n (%)		
< 7 hr/day	19 (27.5)	25 (43.8)
7-8 hr/day	21 (30.4)	11 (19.3)
> 8 hr/day	29 (42.0)	21 (36.8)

Funding: National Institutes of Health grants R01 HL142996, R01ES019196, K26 DK138246 and P30 DK092924. Dr. Hallenbeck received funding from the Translational Research Fellowship Program at the Kaiser Permanente Division of Research

LinkedIn



Bethany.R.Hallenbeck@kp.org