

The Preconception and Interconception Windows: Examining the Evidence for Lifestyle Interventions to Improve Maternal and Fetal Pregnancy Outcomes

Kimberly K. Vesco, MD, MPH

Obstetrician-Gynecologist, Kaiser Permanente Northwest

Senior Investigator, Kaiser Permanente Center for Health Research

Kimberly.k.vesco@kpchr.org

Overview

- Clinical content of preconception care
- ACOG and CDC Recommendations
- Preconception interventions for reducing obesity prior to pregnancy

Clinical content of preconception care

Clinical Areas	Specific Topics
Health promotion	Family planning and the <i>Reproductive Life Plan</i> , physical activity, weight status, nutrient intake, folate, immunizations, substance use, sexually transmitted infections
Immunizations	Human papillomavirus, hepatitis B, varicella, measles, mumps, and rubella, influenza, dTaP
Infectious diseases	HIV, hepatitis C, tuberculosis, toxoplasmosis, cytomegalovirus, listeriosis, parvovirus, malaria, gonorrhea, chlamydia, syphilis, herpes simplex virus, asymptomatic bacteriuria, periodontal disease, bacterial vaginosis group B streptococcus
Medical conditions	Diabetes, thyroid, phenylketonuria, seizures, hypertension, rheumatoid arthritis, lupus, renal disease, cardiovascular disease, thrombophilia, asthma
Psychiatric conditions	Depression/anxiety, bipolar disease, schizophrenia
Parental exposures	Alcohol, tobacco, illicit substances
Family and genetic history	All individuals, ethnicity-based, family history, personal history
Nutrition	Dietary supplements, vitamin A, folic acid, multivitamins, vitamin D, calcium, iron, essential fatty acids, iodine, underweight, overweight, eating disorders
Environmental exposures	Mercury, lead, soil/water hazards, workplace exposures, household exposures
Psychosocial risks	Inadequate financial resources, access to care, physical/sexual abuse
Medications	Prescription, over-the-counter, dietary supplements
Reproductive history	Prior preterm birth, prior C-section, prior miscarriage, prior stillbirth, uterine anomalies
Special populations	Women with disabilities, immigrant/refugee populations, cancer survivors
Men	Preparation for fatherhood, supportive relationships, exposures, genetic history

ACOG Committee Opinion: Prepregnancy counseling

- Goal of preconception care is to reduce risk of adverse outcomes by
 - addressing modifiable risk factors (risk assessment)
 - providing education about healthy pregnancy (education)
 - optimizing maternal health (intervention)
- Any patient encounter with nonpregnant women or men with reproductive potential is an opportunity to counsel about wellness and healthy habits
- Counsel patients to seek medical care before attempting to become pregnant or as soon as they believe they are pregnant

Prepregnancy counseling. ACOG Committee Opinion No. 762. American College of Obstetricians and Gynecologists. Obstet Gynecol 2019;133:e78–89.

ACOG Recommendations for Prepregnancy Care

- Chronic medical conditions that have implications for pregnancy outcomes and should be optimally managed before pregnancy
- Assess immunization status and provide needed vaccinations
- Offer genetic condition screening
- Perform STI screening if indicated
- Screen for intimate partner violence
- Counsel patients with potential infectious disease exposure (e.g. Zika virus) regarding travel restrictions and appropriate waiting time before attempting pregnancy

ACOG Recommendations for Prepregnancy Care

- Review all prescription and nonprescription medications, including supplements
- Routinely asked about use of alcohol, nicotine products, and drugs, including prescription opioids
- Encourage female prepregnancy folic acid supplementation to reduce the risk of neural tube defects (NTDs)
- Screen regarding diet and vitamin supplements to confirm they are meeting RDA for calcium, iron, vitamins A, B12, D, and other nutrients
- **Encourage trying to attain a normal BMI before pregnancy**

CDC Select Panel on Preconception Care

Recommendations to Improve Preconception Health and Health Care- United States

<https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5506a1.htm>

1.	Individual responsibility across the life span. Encourage each woman and every couple to have a reproductive life plan.
2.	Consumer awareness. Increase public awareness of the importance of preconception health behaviors, and increase individuals' use of preconception care services using information and tools appropriate across varying age, literacy, health literacy, and cultural/linguistic contexts.
3.	Preventive visits. As a part of primary care visits, provide risk assessment and counseling to all women of childbearing age to reduce risks related to the adverse outcomes of pregnancy.
4.	Interventions for identified risks. Increase the proportion of women who receive interventions as follow-up to preconception risk screening, focusing on high-priority interventions.
5.	Interconception care. Use the interconception period to provide intensive interventions to women who have had a prior pregnancy ending in adverse outcome (e.g., infant death, low birth weight or preterm birth).
6.	Pre-pregnancy check-ups. Offer, as a component of maternity care, one pre-pregnancy visit for couples planning pregnancy.
7.	Health coverage for low-income women. Increase Medicaid coverage among low-income women to improve access to preventive women's health, preconception, and interconception care.
8.	Public health programs and strategies. Infuse and integrate components of preconception health into existing local public health and related programs, including emphasis on women with prior adverse outcomes.
9.	Research. Augment research knowledge related to preconception health.
10.	Monitoring improvements. Maximize public health surveillance and related research mechanisms to monitor preconception health.

Preconception interventions for reducing obesity prior to pregnancy: working upstream

Observational studies examining interpregnancy weight change and risk of adverse pregnancy outcomes

- Increase in weight of >10 lbs *between* pregnancies is associated with greater risk of subsequent GDM, DM2, preeclampsia, and c-section
- Increase of ≥ 3 BMI units between 1st and 2nd preg (avg 2 yrs) increases risk of gestational hypertension, preeclampsia, c-section, stillbirth, LGA, and GDM
- Weight loss prior to pregnancy may decrease some risks and increase others

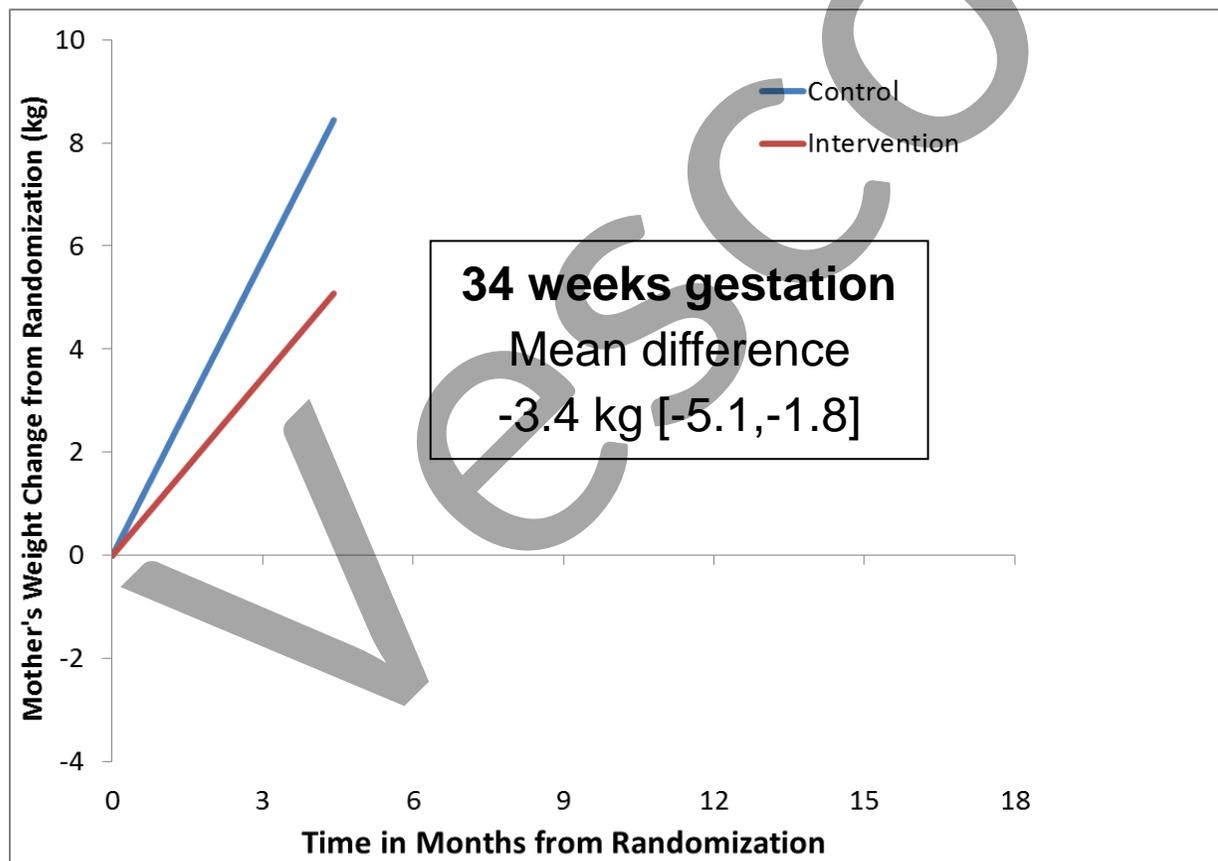
Healthy Moms Study

- Group-based behavioral diet and lifestyle intervention during pregnancy
 - 114 pregnant women with BMI \geq 30
- Key results
 - Participants randomized to intervention:
 - Significantly lower gestational weight gain
 - Did not differ significantly from controls in adverse pregnancy outcomes or weight change from randomization to 1 year postpartum
 - Newborns of intervention:
 - Fewer large-for-gestational-age infants (9% vs 26%; $p=.02$)
 - No significant difference in mean weight-for-gestational-age z-scores
 - 1-year-olds of intervention :
 - Less likely to be at \geq 97.7th percentile on weight-for-length (2% vs 10%; $P=0.18$)
 - No significant difference in mean weight-for-length z-score over the first year

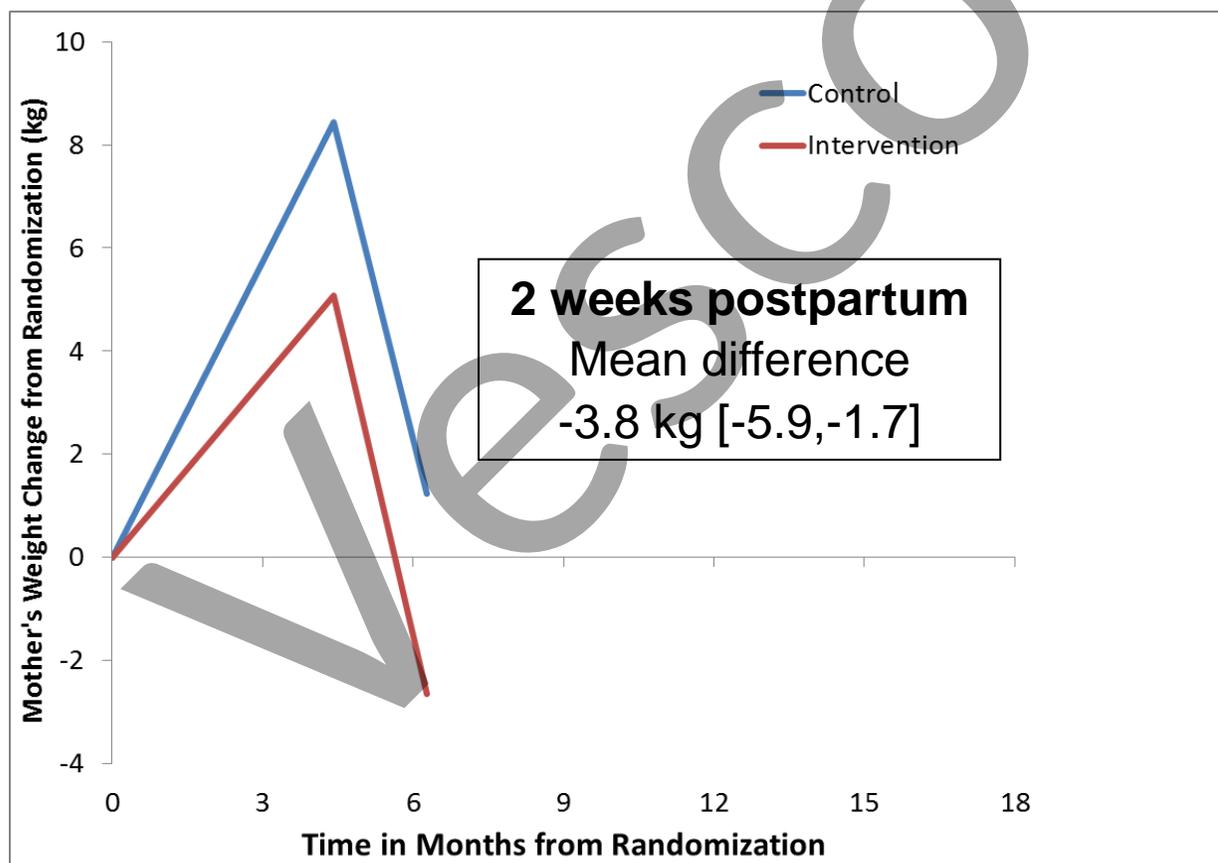
Vesco KK et al. Obesity (Silver Spring). 2014;22(9):1989-1996.

Vesco KK et al. Obesity (Silver Spring). 2016;24(10):2042-2049.

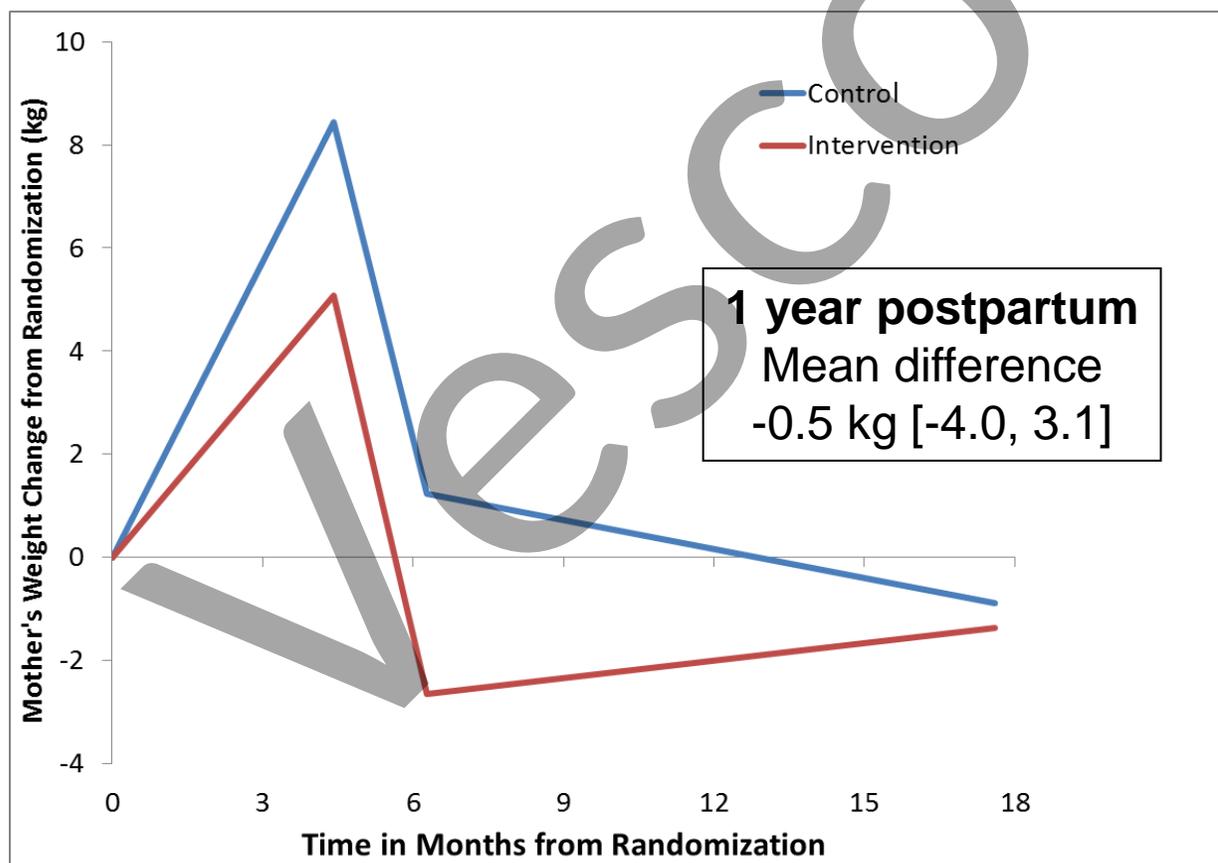
Maternal weight change from randomization



Maternal weight change from randomization



Maternal weight change from randomization



LIFE-Moms consortium

Interventions to limit GWG

- 7 clinical centers, 1150 women with OW or obesity
- Lower GWG (mean difference -1.6 kg, CI -2.18-0.99)
- Less likely to have excessive GWG (61.8% vs 75%, OR 0.52, CI 0.40-0.67)
- No difference in preeclampsia, GDM, cesarean delivery, LGA, or macrosomia

Cochrane systematic review of diet and exercise interventions

- 49 RCTs
- Interventions using diet, exercise or both
 - 20% reduction in GWG (avg RR 0.80, CI 0.73-0.87)
 - 15% reduction in macrosomia (RR 0.85, CI 0.73-1.0) only for women with overweight, obesity, or GDM
 - 30% reduction in hypertension (RR 0.70, CI 0.51-0.96) but not preeclampsia (RR 0.95, CI 0.77-1.16)
 - No difference in cesarean delivery or preterm birth, shoulder dystocia, neonatal hypoglycemia, hyperbilirubinemia, or birth trauma

Is the preconception period a teachable moment?

Survey of 101 women
66 pregnant, 35
considering pregnancy

Question	Considering pregnancy	Pregnant
Healthy diet & healthy weight before pregnancy: <u>Very important or important</u>	98%	98%
Managing weight prior to pregnancy: <u>Very interested or interested</u>	100%	97%
Attend 2 initial appointments with health coach: <u>Very likely or likely</u>	96%	57%
Attend weekly then monthly phone calls: <u>Very likely or likely</u>	91%	72%

PREPARE: A pragmatic RCT of a preconception weight loss intervention

Study population: Women with overweight and obesity (BMI \geq 27) planning a pregnancy in the next two years.

Aims. Determine if the intervention leads to

- Lower rate of gestational weight gain
- Lower weight at first prenatal visit
- Birth weight closer to rather than exceeding national norms
- Improved diet and physical activity (measured in second trimester of pregnancy)

(NIDDK, R01DK0099882; PI: LeBlanc, Cols: Vesco, Smith, Paul, Stevens)

Intervention

- One or two in-person counseling sessions with personal health coach
 - Dietary advice, personalized calorie goals
- Individualized phone counseling from health coach
 - Based on behavior modification paradigm
- Frequent contact
 - Weekly for 6 months
 - Monthly for up to 18 months
- Intervention ends at delivery (or 2 years if no pregnancy)
- Weight loss goals:
 - Before pregnancy: 0.5 to 1 lb/week
 - Tailored when become pregnant to meet IOM guidelines for GWG
- Participants review supporting materials and track weight, food and activity records on website

Behavior change goals

Be active and engaged

Keep appointments

Use study website

Set short-term goals & create action plans

Manage calories to be within customized target

Use meal pattern to stay within calorie target

Control portion sizes

Replace high-calorie with lower-calorie options

Limit sweets and sugar-sweetened beverages

Follow DASH dietary eating pattern every day

Eat 8-12 servings of fruits and vegetables

Eat 3 servings of low-fat dairy

Limit fat intake (to 25% of calories)

Aim for 6 small meals and snacks

Increase daily physical activity

Find ways to move more; aim for 10,000 steps

Exercise daily (gradually work to 60 minutes moderate-intensity most days)

Follow your doctor's advice

Keep records

Weigh yourself at least weekly

Track everything you eat and drink

Track your exercise

Prepare Study Participants

- 326 randomized (IG 164, CG 162)
- 169 singleton pregnancies lasting ≥ 14 weeks gestation (IG 89, CG 80)
- Mean BMI at randomization 34.8 kg/m²
- 84% White race, 9.5% Hispanic ethnicity

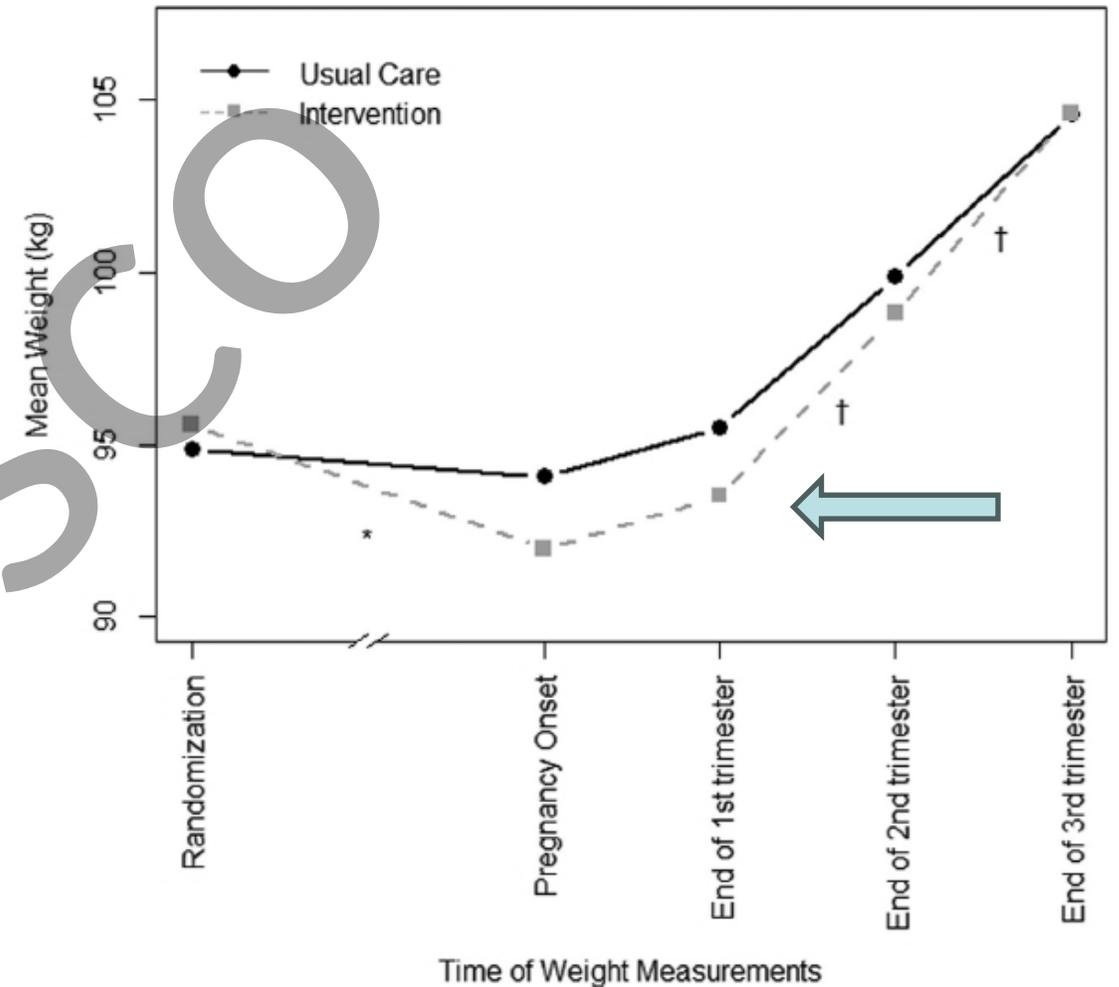
Prepare results

- Weight loss prior to pregnancy was greater in the IG ($p < .001$)
 - IG -3.7 ± 8.3 kg (3.5% of baseline wt)
 - CG -0.6 ± 8.1 kg (0.5% of baseline wt)
- BMI change
 - IG -1.32 vs CG -0.25 kg/m² ($p = .02$)
- BMI change from Obese to OW
 - IG 15.5%, CG 5.3% ($p = .04$)
 - None dropped to normal weight

Prepare results

- No difference in percent exceeding IOM/NAM GWG guidelines
- Higher mean GWG in IG vs CG
 - 2nd trimester 0.4 vs 0.3 kg/wk; $p=.04$
 - 3rd trimester 0.6 vs 0.4 kg/wk; $p=.02$ trimesters,
- Higher overall GWG in IG at term
 - 13.2 vs 10.3 kg; $p=.03$).

FIGURE 2
Gestational weight gain between intervention and usual care groups



The numbers in analyses decrease in later time points in pregnancy as shown in Table 6. * $P<.001$; † $P<.05$.

LeBlanc et al. Prepare: a prepregnancy weight loss randomized controlled trial. *Am J Obstet Gynecol* 2021.

Prepare Maternal and Newborn Outcomes

- IG had lower rate of pregnancy loss (aOR 0.39; 95% CI 0.16, 0.92)
- No difference in maternal outcomes of GDM, hypertensive disorders, cesarean delivery, preterm birth
- No difference in neonatal outcomes of LGA, SGA, hypoglycemia or respiratory morbidity
- Ongoing follow up to assess maternal and child outcomes at 3-4 years postpartum (PREPARE-OS, NICHD, LeBlanc PI, Vesco Co-I)

Retrospective pregnancy cohort examining preconception weight trajectories

Kaiser Permanente Northwest EMR data

14,546 Women with live births in 2000-2007



Inclusion: First observed singleton live birth in the study period. Excluded women without maternal weight within 24 months pre-pregnancy

Building Interdisciplinary Research Careers in Women's Health (Oregon BIRCWH) K12

Scholar: Boone-Heinonen; KPNW Collaborators: Stephen Fortmann (mentor), Kimberly Vesco

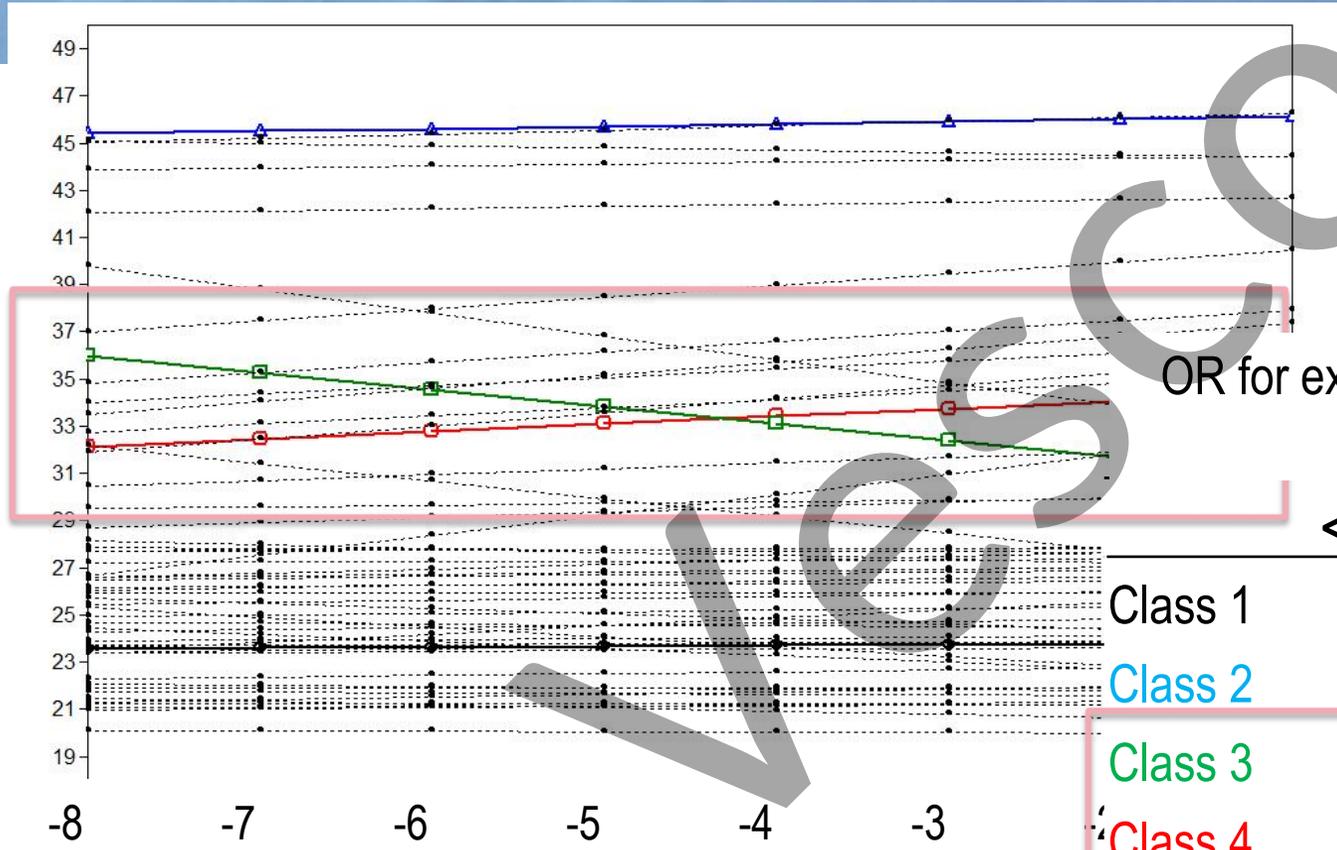
Preconception weight loss predicts excessive gestational weight gain

Class 2
(n=274)

Class 3
(n=214)

Class 4
(n=1,262)

Class 1
(n=6,186)



OR for exhibiting > or < recommended gestational weight gain

	<Recommended	>Recommended
Class 1	(ref)	(ref)
Class 2	1.99 (1.41, 2.80)	1.04 (0.74, 1.46)
Class 3	0.91 (0.56, 1.47)	1.79 (1.25, 2.57)
Class 4	1.48 (1.22, 1.80)	1.61 (1.36, 1.90)

IOM 2009 BMI-specific guidelines. Multinomial logistic regression, controlling for age and insurance source. Referent outcome: within guidelines

Quarter relative to pregnancy

Preconception bariatric surgery and pregnancy outcomes

- Retrospective cohort study (Getahun et al)
- KP Southern California bariatric surgery registry and pregnancy data
- Study population:
 - Pregnant women who underwent surgery at any time before pregnancy compared to pregnant women who were eligible for surgery but not recorded as having had surgery
 - Singleton gestations lasting 20 or more weeks

Getahun D et al. AJOG 2022; 226(1):121.e1-121.e16. doi: 10.1016/j.ajog.2021.06.087

Preconception bariatric surgery and pregnancy outcomes

- Pregnant persons who had surgery compared to those who had not had surgery
 - Lower risk:
 - GDM, preeclampsia, chorioamnionitis, cesarean delivery, large for gestational age infant, macrosomia, NICU admission
 - Increased risk:
 - small for gestational age infant
 - Higher gestational weight gain:
 - Mean gain 19.7 vs 9.2 lbs ($p < .001$)
 - Proportion with excessive weight gain 48% vs 33%

Preconception weight loss: implications and next steps

- Implications

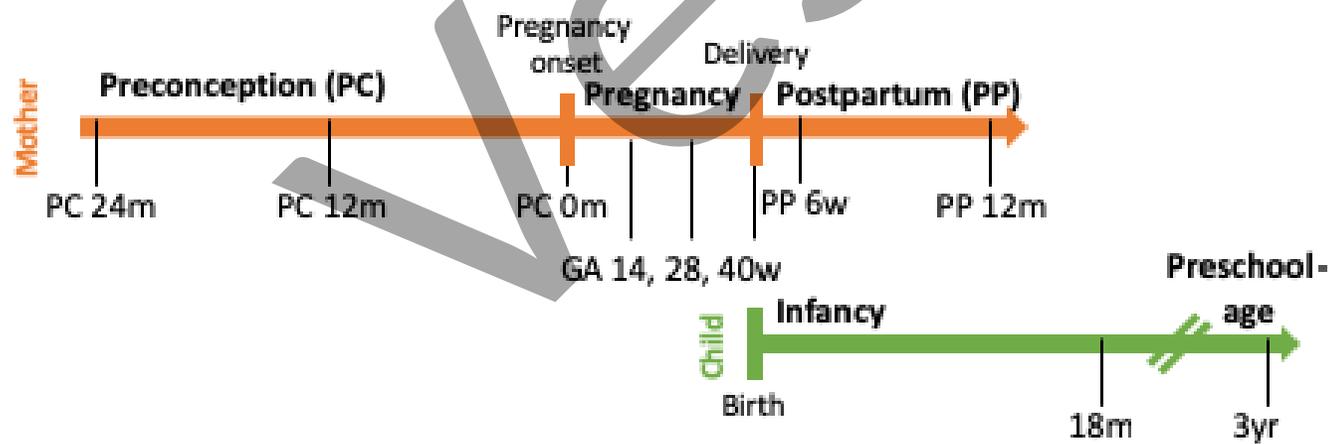
- Potential unintended consequences of preconception weight loss
- May require long-term support throughout pregnancy
- Impact on energy regulation during pregnancy needs to be better understood

- Next steps

- Larger observational studies and RCTs examining preconception weight change

MatTrack: Maternal Preconception Weight Trajectory Study

- **Objective:** To examine the impact of maternal preconception weight change on maternal and child health (GWG, post-partum weight retention; pregnancy and birth outcomes, child growth)
 - Within baseline BMI category, including obesity class I, II, III
- **KP Sites:** KP Northwest (Vesco), Hawaii (Oshiro), Southern California (Young), Georgia (Owen-Smith/McCracken)



POSIT: Preconception obesity treatment: bariatric surgery and long-term maternal and child health outcomes

- Ongoing retrospective cohort study using KP EMR data to determine if surgically-induced preconception weight loss can reduce long-term risk of obesity and obesity-related complications in the offspring through 6 years of age

NICHD R01HD109246: (mPIs Purnell, Boone-Heinonen; Co-Is Vesco, Getahun, Oshiro)

Summary

- National organizations provide evidence-based guidelines for preconception care across multiple domains
- Achieving normal BMI prior to pregnancy is recommended given the risks to the mother and child that are associated with obesity during pregnancy, however, little evidence is available to guide clinicians on how to help patients achieve preconception weight loss in a manner that optimizes offspring health outcomes

Discussion

Vesco